

Contractors and Engineers Monthly

Vol. 37, No. 2

FEBRUARY, 1940

\$2 a Year, 20 Cents a Copy

Highlights Of This Issue

• Pennsylvania Turnpike

Our series of articles on this outstanding highway project continues with descriptions of the work on Contract 27, involving a 1,150,000-cubic yard earth and hard rock cut 438 feet wide and 2,475 feet long, as well as the construction of Clear Creek Bridge; and on Contract 28 for a bridge, channel change excavation, and grading.

See page 2.

• Solving Ground Water Problem

When the contractor for Imhoff tanks for a new sewage treatment plant at Meriden, Conn., encountered unusual strata and a difficult drainage problem in keeping the work dry, he installed a wellpoint system which did the trick.

See page 2.

• Hot Mix, Cold-Laid

A new type of bituminous mix was used in Massachusetts during the 1939 construction season. The largest of these projects is described in this issue.

See page 7.

• Unusual Welded Structure

To speed the work at La Guardia Airport, New York City, an unusual floating swing span of all-welded construction was installed. The use of welding resulted in some interesting details of design as well as decreasing costs.

See page 15.

• County Highway Work

The organization, problems of road construction, maintenance and snow removal, and equipment of the Ottawa County, Mich., Highway Department are described in this issue.

See page 18.

• Large Sewer Project

The first of a series of articles on the construction of 4.66 miles of trunk sewer for Boston suburbs describes the various sections of this project and some of the problems involved.

See page 21.

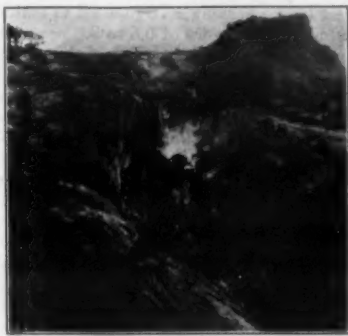
• Roadside Development

The ingenious equipment developed by Winston & Griffith, winner of the 1939 National Roadside Development Award, for sodding and erosion control and their methods for this type of work are described in this issue.

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Starting a deep cut in Pacheco Pass.

Snow-Free Roads, By Public Demand

Lawrence County, S.D., One Of Few in Dakotas Which Keeps Its Highways Open During Winter Months

† THE winter motorist who wanders off the state-maintained trunk highways in the northern snow-belt states west of the Mississippi River frequently drives only a few miles on township or county roads before he is completely snowed under. Although the state highway departments in these states clear all roads on the

(Concluded on page 8)

Engineers Make Pass, Cut Curves and Grade On California Route

(Photos on page 44)

† OUR title does not refer to the amorous pass, nor even the forward, poker or Annie Oakley, but to an old historical trail in Santa Clara County, California, which dates back to Indian days and where, in the 60's, a toll road connected the San Francisco Bay area with the San Joaquin Valley. Work on the improvement of Pacheco Pass, State Highway 152, was started November 15, 1938, by Granfield, Farrar & Carlin of San Francisco, Calif., and has reduced the curvature of the road from 2,313 degrees to 295 degrees and eliminated 31 curves in a distance of 3.46 miles. At the same time the minimum radius of the curves has been increased from 160 feet on the old road to 850 feet on the new location. There is even a saving of 0.83 mile as a result of this work.

Grading

The largest cut on the job was located about one mile from the west end of the contract. It was figured to be a rock cut of about 130,000 cubic yards with a maximum height of 124 feet and about 700 feet long. The designed slopes were the standard $\frac{1}{2}$ to 1 for such cuts. When

Contractor's Work Through Pacheco Pass, Santa Clara County, Calif., Has Deep Cuts and Long Fills

the contractor tackled the cut, the rock was a good hard basalt on the south side but the north side turned out to be earth with boulders up to 2 cubic yards. That meant cutting the slope back to 1 to 1 and added some 43,000 yards of excavation to the "unclassified" item.

To handle this cut, the contractor cut a construction road half way up the slope with a bulldozer and then went up with the Carryalls and worked downhill. On some of the steeper parts of the slope the pans of the scrapers were dropped to brake the speed of the load. This cut a narrow one-way road into the harder material which gradually went several feet below the designed cut for that point. The section was backfilled and rolled, a much cheaper operation than losing a couple of scrapers and tractors over the end of the dump.

The dirt moving in the big cut, except for the basalt rock on the south side, was handled by three 14-yard Carryalls pulled by D8 tractors. Another D8 pulled a LeTourneau ripper in its spare time to break up the soil for easier loading and with its bulldozer gave the Carryalls a boost while loading. In addition, another bulldozer on a D8 tractor was used to boost the Carryalls while loading and keep oversize boulders pushed to one side.

In the remainder of the cuts west of the big cut, Carryalls were used exclusively for moving the dirt. During the period of greatest activity the contractor had three 18-yard, two 14-yard and two 20-yard Carryalls, pulled by D8 tractors; two LeTourneau rippers pulled by D8 tractors; and an average of five D8 tractors equipped with bulldozers engaged in assisting the Carryalls in loading and in opening pioneer roads.

The fill which took most of the material from this large cut is 1,000 feet long, requiring an average haul of 1,300 feet. The fill is 100 feet high on the center line and 130 feet on the lower side. To compact the fill, the contractor used an Austin Aristocrat 12-ton and an Acme 12-ton roller with LeTourneau sheepsfoot rollers pulled by D8's, and a bulldozer for spreading the fill. To provide the water needed for maximum density a 1,500-gallon water tank mounted on a White truck was run over the newly spread material as required. The finishing touches on the fill as well as road maintenance about the work was done by a No. 11 Auto Patrol. The con-

(Continued on page 16)

WINSTON & GRIFFITH WINS NATIONAL AWARD



At left, W. O. Winston of Winston & Griffith, winner of the 1939 CONTRACTORS AND ENGINEERS MONTHLY National Roadside Development Award, with the silver loving cup presented to his firm at the A.R.E.A. annual banquet; Editor Theodore Reed Kendall who made the Award presentations; J. C. Griffith, also of Winston & Griffith, with the plaque won by the firm as the Southern Section Award; and, seated, G. H. Lowe, winner of the Central Section Award. M. E. Hatch, who won the North Atlantic Section Award, was unable to be present at the banquet.

PENNSYLVANIA TURNPIKE

A Rock Cut 153 Feet Deep Replaced Proposed Tunnel; N. R. Corbisello Hit Rock With Five Wagon Drills

(Photos on page 44)

♦ BIDS on Contract 27, Section 13-E, of the Pennsylvania Turnpike Commission, were taken July 19, 1939, and the contract awarded the following day for \$882,710.48, allowing the contractor, N. R. Corbisello, Inc., Binghamton, N.Y., 210 calendar days to complete this 1,150,000-cubic yard earth and hard-rock cut 153 feet deep, 438 feet wide at the maximum depth and 2,475 feet long. This Clear Ridge cut was originally intended to have been the eighth tunnel, 1,700 feet in length, on the Turnpike, but studies showed that considerable money could be saved by making the crossing of Clear Ridge by open cut.

This contract also included the construction of Clear Creek Bridge and a 270-foot underpass with a 36-foot span and a clearance of 26 feet, and the relocation of 4,300 feet of old state highway to eliminate the cost of an interchange at the deepest point of Clear Ridge cut.

Overburden and Rock Drilling

The hard rock of Clear Ridge cut was overlaid by about 15 feet of earth, which was taken out quickly with three Le-Tourneau 20-yard Carryalls pulled by D8 tractors and requiring from 1,700 to 1,800 feet of haul down a steep grade. When drilling started, the contractor brought in four Gardner-Denver and one Ingersoll-Rand wagon drills, each with a drill man and a helper, and ran 12-foot holes, using I-R 2 1/4 down to 2 1/2-inch Jackbits. Air for these drills was furnished by two Worthington portable compressors of 315 and 210-cubic foot capacity and one Chicago Pneumatic 720-cubic foot diesel portable compressor. Occasionally a couple of I-R Jackhammers were used in tight places and for blockholing the few large pieces left after blasting.

Drilling was done over an area 400 x 200 feet with the holes on 6-foot centers and then the section was loaded and fired and the rock removed while the drills were being set up in another similar area adjacent. About the only difficulty experienced in the drilling operation was the excessive amount of water in the rock, making it necessary to blow each hole with compressed air immediately ahead of loading. In one section of the cut there was a flowing well which disappeared entirely after one of the blasts. The situation in this cut was duplicated in others on the Turnpike, in that water was found in rock high above the elevation of the surrounding country.



C. & E. M. Photo
Blowing a drill hole at the top of the 153-foot deep Clear Ridge cut where water showed up unexpectedly.

The contractor had some four to eight powder men, each with a helper, because of the speed at which he was operating and also the need of blowing each hole clear of mud before loading with American Cyanamid Co. 40 per cent gelatin dynamite. The holes were shot with electric blasting caps fired from the same Kohler portable lighting plant used for illuminating the work at night. After a small amount of experimentation, in cooperation with representatives of the manufacturer, it was found that the plant handled heavy shooting very well, giving good breakage in the rock.

Loading the Rock

The contractor operated three diesel-powered Lorain shovels, two 1 3/4-yard and one 1/2-yard units, all equipped with

(Concluded on page 12)

Two 52-Foot Arch Spans Over Clear Creek Are 328 Feet Long and Will Carry 76-Foot Fill for Roadway

(Photo on page 44)

♦ CLEAR CREEK Bridge, included in Contract 27, Section 13-E, on the Pennsylvania Turnpike, which was awarded to N. R. Corbisello, Inc., of Binghamton, N.Y., is really a glorified culvert. The structure consists of two 52-foot arch spans skewed 75 degrees, with a center pier, a rise of 25 feet, and 328.4 feet long, carrying a 76-foot fill to maintain the low grades of 0.5 to 3.0 per cent prevailing from end to end of the Turnpike.

This heavy surcharge made it necessary to design the headings of the structure for a 25-ton per square foot loading, but before construction was started the bridge engineers of the Turnpike Commission reduced this loading by widening the footings. The arches are heavy, being 3 feet 10 inches thick at the haunches and 1 foot 10 inches at the crown, and very heavily reinforced. This bridge required 5,058 cubic yards of structure excavation designated as Class II, and 3,950 cubic yards of excavation above the footings and between the spans to clear the channel, designated as Class I. A total of 4,550 cubic yards of Class A concrete and 4,340 cubic yards of Class B concrete were used in the structure.

Channel Change and Excavation

Clear Creek was temporarily by-

(Concluded on page 13)



C. & E. M. Photo
Looking east from the lower ramp over Dunning Creek at the bridge site toward the easterly cut.

Channel Change on Bridge And Grading Contract Saves One Bridge and Removes Loop of River

♦ CONTRACT 28, Sections 12B and 13A, of the Pennsylvania Turnpike Commission located near the old concrete arch bridge on U.S. 30 just east of Bedford, Pa., required 1.3 miles of grading, the construction of one bridge, an overpass and a drainage structure, and a channel change which eliminated the necessity of constructing another bridge. A family living within the limits of this contract actually had its geographical location changed without moving at all. The Raystown Branch of the Juniata River and Dunning Creek converged just north of this house. To avoid bridging the combined streams, the Turnpike Commission moved the channel of the Raystown Branch southward out of the line of the Turnpike. Over the original bed of Raystown Branch the waters of Dunning Creek are now flowing, and the Turnpike will cross this creek alone on a bridge built by M. Bennett & Sons of Indiana, Pa. The contract was awarded May 24, 1939, allowing 200 days for completion and requiring the removal of 393,251 cubic yards of unclassified excavation divided about equally between a west and east cut and including some 50,000 cubic yards of channel change excavation and 20,000 yards of structure excavation.

Raystown Branch Channel Change

The first operation when Bennett

(Concluded on page 32)

Ground Water Problem On Imhoff Tank Job

Aberthaw Co. Encountered Unusual Strata at Site of Meriden, Conn., Plant; Used Wellpoints Throughout Work

(Photo on page 44)

♦ DURING the 1939 construction season, an Imhoff-tank sewage-treatment plant was built at South Meriden for the City of Meriden, Conn. The work consisted of the construction of an administration building; the installation of grit chambers, Chicago comminators, metering and chlorination equipment; the complete reconstruction of the existing distribution system for applying the tank effluent to sand beds; and the construction of a group of four Imhoff tanks ahead of the present intermittent

sand filters which have provided the only treatment of Meriden sewage prior to its discharge into a nearby stream.

The contract for the construction of a flow-reversal chamber and the two pairs of Imhoff tanks was awarded to the Aberthaw Co. of Boston, Mass., whose work was featured by simple easily-handled forms, excellent concreting, and the effective unwatering of the site with wellpoints.

The Plants, Old and New

The old sewage treatment plant consisted solely of 17.5 acres of intermittent sand filters without underdrains. Six small beds of the old plant at a lower elevation than the major portion of the plant were rebuilt as three larger beds. One pair of old high-level overflow beds which are used in the new plant to take care of the peak of the storm flow over and above the capacity of the plant were reconstructed, with new inlets and overflow outlets. The sewage applied to these beds is chlorinated before application. The other regular beds take the usual normal flow. This feature of the design gives greater flexibility to the plant, as the overflow beds can be used for any special purposes desired.

Sewage is now admitted to the Imhoff tanks through 14-inch risers and then flows over an adjustable weir wall to the tank proper and out the other end under a scum board, and over a weir. Inlets and outlets are identical, permitting easy reversal of the flow through the tanks.

The new drying area for the Imhoff sludge comprises twenty-four beds meas-

(Continued on page 28)



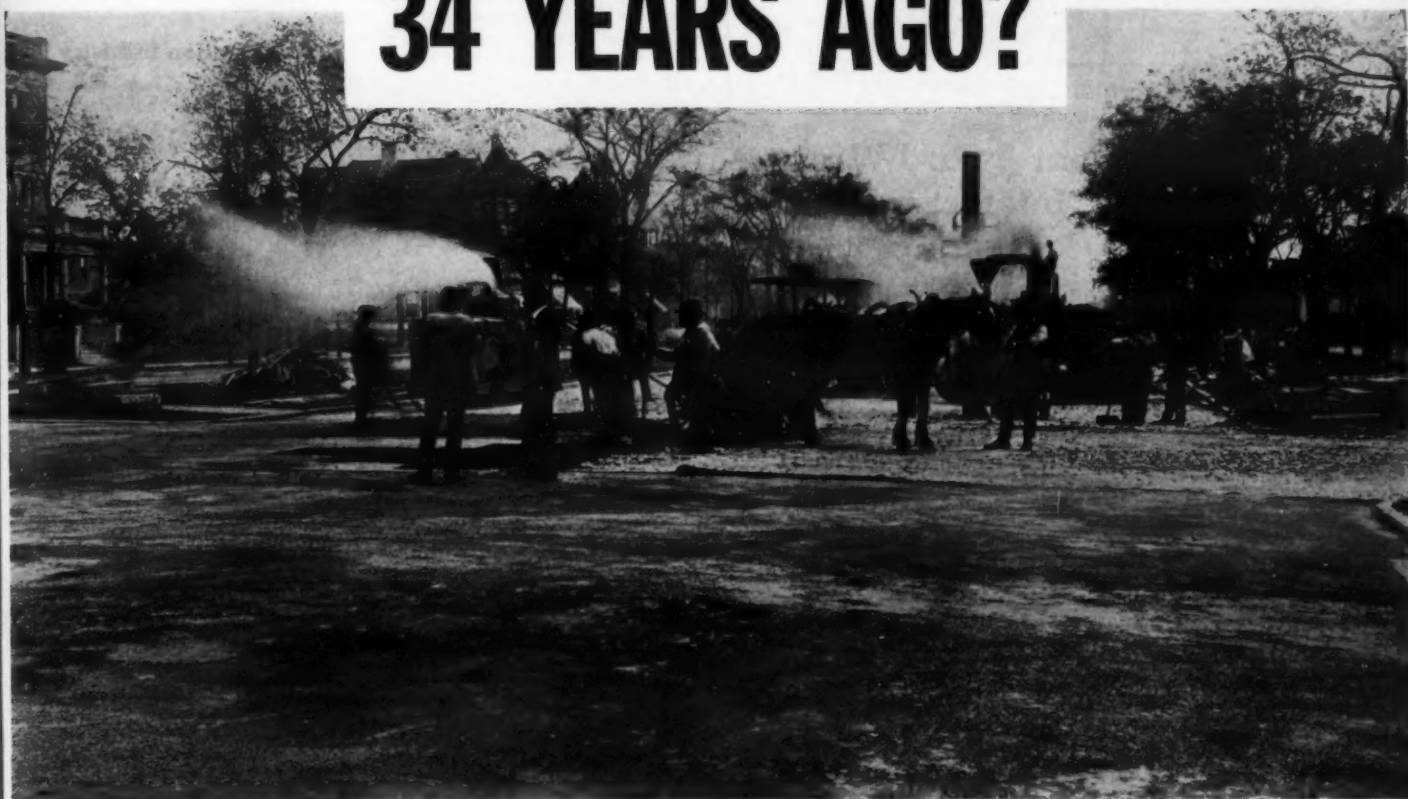
C. & E. M. Photo
A 1 1/4-yard Lorain shovel loading a 9-yard Linn tractor at the top of Clear Ridge cut.



C. & E. M. Photo
A part of the wellpoint system used to unwater the Imhoff tank excavation after the side walls stopped free drainage to a single open sump.

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34 YEARS AGO?



Among paving contractors who are laying America's huge mileage of Asphalt paving today, just a handful of old-timers will be able to answer "yes" to that question.

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Contractors and Engineers Monthly

THE NATIONAL BUSINESS PAPER OF THE CONSTRUCTION INDUSTRY

Member of Controlled Circulation Audit

Issued Monthly by Bittenheim-Dix Publishing Corp.
Editorial and Business Office: 470 Fourth Ave., New York City
Printed in Mount Morris, Ill., U. S. A.

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Roadside Development Award Winners Prove Contractors' Interest in Work

The purpose of CONTRACTORS AND ENGINEERS MONTHLY in sponsoring the Annual Roadside Development Awards was to stimulate greater interest and co-operative effort on the part of highway contractors in the basic roadside-development work involved in their highway contracts. That such interest and desire to go beyond the actual specifications of the contract in order to do a thoroughly good job exist is evidenced by the type of work described in the nominations submitted for the Awards.

Again and again we found in the 1939 nominations such statements as "This contractor was extremely cooperative and willing to accept the suggestions of our engineers" or "This contractor exceeded in a number of cases the specifications of the contract in order to handle the work more satisfactorily and to achieve better results" or "The care which this contractor took in preserving existing roadside vegetation and trees increased his unit cost slightly but nevertheless he handled the work this way in order to prevent damage to the trees which were marked to be saved." All this indicates to us that there are a large number of highway contractors who are genuinely and sincerely interested in doing a good job, who take pride in their work, and who are motivated by something more than just the monetary profit to be taken from the job. To such men as these, the fine highways and roadsides of the United States are worthy monuments.

In the case of the winners of the 1939 Sectional Awards, each one exhibited unusual cooperation with the state highway department engineers on the jobs for which they were nominated. In addition to their specific contribution, all

were recommended especially for their fine spirit of helpfulness and interest in their roadside-development work.

The details of the nomination winning both the Award for the Southern Section and the National Award may be found in the article on Winston & Griffith's contribution to roadside development elsewhere in this issue, and the other Award-winning jobs will be described in subsequent issues.

It is not too early to start thinking about the potential winners of the Awards for 1940. Last year a number of state highway department engineers wrote that they had no nominations to make, but

ROADSIDE DEVELOPMENT FOR TEXAS HIGHWAY

Scenes on an erosion-control project in Texas, for which the contractor, Winston & Griffith of Dallas, won the 1939 CONTRACTORS AND ENGINEERS MONTHLY National Roadside Development Award. 1. An eroded fill slope, on the downstream side of a culvert. 2. The same fill slope after sodding treatment. 3. Winston & Griffith's sod-loading machine in operation. 4. A portion of a typical eroded slope. 5. The same highway after the erosion-control work, showing flattened fill slopes in the background and, in the foreground, the slope shown in Photo 4, now sodded. 6. W. O. Winston, and 7. J. G. Griffith, of the partnership of Winston & Griffith. See page 23.

A. G. C. Convention

The 21st annual convention of the Associated General Contractors of America was held at the Hotel Peabody, Memphis, Tenn., February 5 to 8.

Outstanding among the speakers were Assistant Secretary of War Louis Johnson who addressed the members on "Construction in War and Peace"; Major General Julian L. Schley, Chief of Engineers, U. S. Army; H. K. Bishop, Chief, Division of Construction, Public Roads Administration; Representative Wilburn Cartwright, Chairman of the House Roads Committee; John P. Coyne, President, Building and Construction Trades Department, A. F. of L.; and John C. Page, U. S. Commissioner of Reclamation.

H. B. Zachry of Laredo, Texas, was installed as the new President of the Association, and M. W. Watson of Topeka, Kans., as Vice President to succeed Mr. Zachry.

we believe that after carefully considering the type of work for which the 1939 winners received their Awards, they will find that there are highway contractors working in every state in the Union during 1940 who are worthy of nomination for these Awards. So start now to gather the necessary data and "before" pictures. If any state highway engineers, by whom the nominations must be made, or contractors desire further details or have any questions, just write to the Editor and all the information desired will be sent immediately.



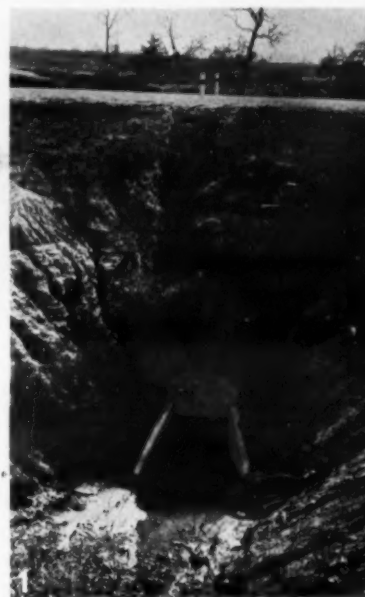
"Sandy, our bid will be \$33,000.00—3 cents for mailing the bid."

Construction Industry Census

Since January 2, a large number of census takers have been in the field, calling on representatives of the construction industry for their contributions to the Sixteenth Decennial Census. The census of construction activities will be a part of the Census of Business.

This census will record the activities of the industry last year, in each state and in the larger cities, summarizing the reports of all general contractors as well as special contractors.

Since the value of the information being compiled will depend very largely on its timeliness, the cooperation and quick response of the industry is of the utmost importance. With its full cooperation, it is expected that the basic information at least may be published in the early autumn.



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A new dirt-moving unit, consisting of a Walter four-point positive-drive tractor and a Heil 16-yard Dig-N-Carry scraper.

New Tractor-Scraper For Dirt-Moving Jobs

Among the new dirt-moving equipment on exhibit at the A.R.B.A. Road Show in Chicago was a new type of unit consisting of a Walter four-point positive-drive tractor with a Heil 16-yard Dig-N-Carry scraper, made by the Heil Co., Milwaukee, Wis. This type of equipment, now offered for dirt-moving service, is claimed to provide a combination which can move large quantities of dirt at low cost per yard, even with comparatively long hauls.

The features of this Walter tractor include automatic lock or torque proportioning differentials, giving a positive drive to all four wheels under all operating conditions; suspended double-reduction drive; powerful motors, either gasoline or diesel; a tractor-type transmission with six forward and two reverse speeds and single lever control; and a set-back front axle with the cab forward, giving a short wheelbase for quick turning, and proper weight distribution.

Complete information on this Walter tractor for dirt-moving service, as well as the Walter 100-hp diesel-powered four-point positive-drive road maintenance truck and the Walter Snow Fighter, both of which were also on display at the Road Show, may be secured direct from the Walter Motor Truck Co., 1001-19 Irving Ave., Ridgewood, L. I., N. Y.

Supercharged Diesels At A.R.B.A. Road Show

One of the new pieces of equipment to be exhibited at the A.R.B.A. Road Show in Chicago this month was the new light-weight 125-hp supercharged Model AAS-600 diesel engine recently developed by the Cummins Engine Co., Columbus, Ind. Originally designed and built to meet the requirements of the U. S. Navy, the first Cummins supercharged diesel of 200 hp has been put into a wide variety of services, in trucks, cranes, shovels and similar construction equipment where plenty of horsepower is needed in a small space.

The new Model AAS-600, like all Cummins diesels, operates on the four-cycle principle, has a 4 x 5-inch bore and stroke and develops maximum horsepower at 2,200 rpm. This engine weighs only 10 pounds per horsepower, including the weight of standard equipment such as electric starter, etc.

Since the Cummins full diesel depends only on fuel and air for its operation, the amount of air in each cylinder on each power stroke determines the amount of fuel which can be burned efficiently on that power stroke. The fundamental principle of supercharging is to put more air into each cylinder which makes possible burning more fuel or a more efficient burning of the fuel charge on each stroke. When this occurs, there is a corresponding increase in the volume of expanding gas, and therefore an increase in the mean effective pressure or "push" on the piston over a longer period of time during its power stroke. The supercharging unit is merely a small compressor or blower which creates a pressure behind the air entering the diesel through the intake manifold. The supercharged Cummins diesel has approximately 7 to 8 pounds of air pres-

sure in each cylinder at the start of the compression stroke. The unit is attached to the manifold side of the engine and is belt-driven through a slip clutch from the front end.

To keep peak pressures within practical limits, Cummins diesels are equipped with a Cummins injector which injects the fuel oil into the cylinder by means of a mechanically operated plunger, making for a progressive injection of fuel during the power stroke. The manu-

facturer claims that this feature makes for smoother operation, greater torque, and a more efficient use of the fuel.

Like all Cummins diesels, the new supercharged models are equipped with a low-pressure pump which accurately meters and delivers the fuel to the cylinder where it is gasified and progressively injected during the power stroke.

Complete information on the Model HBS-600 200-hp diesel and the new AAS-600 125-hp diesel, both of which were featured at the Cummins exhibit at the Road Show, may be secured direct from the manufacturer by mentioning this item, or from this magazine.

Hundredth Anniversary Celebrated by Dietz Co.

This year the R. E. Dietz Co., of New York City and Syracuse, N. Y., manufacturer of portable lighting equipment, celebrates its 100th anniversary. Founded by Robert E. Dietz, grandfather of the present president of the company, this firm began as a small lamp and

oil business and has grown in successive stages to become America's largest lantern factory.

As the company enters its second century of progress, President Dietz affirms its intention of continuing its same vigorous activity and standards of quality in the production of oil-burning portable lights and lanterns.

Higgins Joins A.I.S.C.

T. R. Higgins, former Chief Engineer of the New England Structural Co. of Everett, Mass., joined the staff of the American Institute of Steel Construction last month as District Engineer in the New York district. Mr. Higgins has been Chief Engineer for the New England Structural Co. for the past eight years, prior to which he was Structural Engineer for six years for Stone & Webster Engineering Corp. He has also served in the Bridge Division of the Massachusetts Department of Public Works and in the office of the Chief Engineer of the Santa Fe Railroad in Texas.

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Hot-Mix Cold-Laid Massachusetts Road

**M. A. Gamino Constr. Co.
Completed 3-Mile Contract
Using Old Road for Base
Or, New Penetration Base**

AMONG the modified Type I paving materials used in Massachusetts during the 1939 construction season was a Colprovia mix with slightly larger aggregate and more of it, less sand and less bituminous binder. The largest project on which this material was used was a 3-mile contract from Lee's River Bridge at the Somerset line near Fall River through Swansea to the Rhode Island state line. The new design mix was laid over old Type I pavement for about one mile, saving the old material for foundation except where there were grade changes. The remainder of the old road was waterbound macadam with a tar surface treatment, all of which was removed and replaced with 12 inches of gravel. The new roadway is 36 feet wide for the first 8,900 feet, except at two bridges, where it is narrowed to 33 feet in 150 feet of approach to the bridge structures, and the balance of the project is 33 feet wide.

Preparation for Paving

Since the larger part of the road is through built-up territory there were the usual subsurface structures to care for. Storm sewer pipe from 10 to 30 inches diameter of plain concrete in the smaller sizes and reinforced for the 18, 24 and 30-inch sizes was installed for almost the entire length of the project. There were 152 structures, including manholes and catch basins, and a 5 x 5-foot box culvert and a cattle pass of the same dimensions. A new Northwest 3/4-yard shovel with a trench hoe was used for the trench excavation and later a Universal crane mounted on a Mack truck was used with a clamshell to excavate most of the manholes and catch basins and the headwalls. Finally the truck crane was used to handle the riprap at the bridges.

A 1 1/4-yard Northwest with a 60-foot boom and a Hayward clamshell was used to excavate a hole of peat which was backfilled by end-dumping gravel.

To pump out the structure excavation at headwalls and box culverts, a Myers double diaphragm pump was used. A pair of Jaeger Sure-Prime centrifugals were used to fill the water trucks serving the rollers. These same trucks hauled water for the puddling of all the trenches, manholes and catch basins to give the best compaction because the contractor could not wait for natural

compaction. The speed of paving was so great that the structures had to be completed and the trenches ready to be paved over in fast time. The specifications required the backfill to be put in 12-inch layers and tamped. The contractor also used over a million gallons of water to speed up the compaction of the backfill.

The concrete for the structures was all mixed in a 2-yard Rex truck mixer mounted on a Ford cab-over-engine truck. For the largest pours another Rex, a 3 1/2-yard unit on an Autocar, was sent out to the job from the contractor's yard in Providence, R. I. The aggregates were batched at a local commercial gravel pit.

The stripping of the gravel pits for the 12-inch gravel base or cushion



C. & E. M. Photo

The Adam Black Top Paver spreading the surface course of Colprovia

course was done with two D6 tractors equipped with LaPlant-Choate bulldozers and a D7 pulling an 8-yard Carryall scraper, followed by the bulldozers for cleaning up. The excavation of the gravel was done with one of the two Marion 1 1/2-yard shovels loading to a maximum of fourteen Mack trucks owned by the contractor, four of which

had been converted to diesel operation with Cummins diesels.

For the small amount of rock excavation the contractor used two Ingersoll-Rand portable compressors, a 120 and a 360, with J55 I-R Jackhammers, a Sullivan wagon drill and I-R detachable bits. The holes were shot with 40 and 60

(Concluded on page 42)

Presenting the 19"40A" Model of a PROVED 3/4-YD. MACHINE

• Here's a shovel with a past and an even greater future. Its past—outstanding performance on hundreds of installations and millions of yards of excavation. Its future—everything that's made this record possible plus the results of constant improvement for increased efficiency and economy. The 3/4-yd. Lorain-40A retains all the time-tested advantages of Balanced Center Drive design and adds such basic features as choice of chain or rope crowd, increased crane capacities, and Diesel power, plus

many minor, but important, refinements too numerous to mention.

And here's a prediction. The Lorain-40A is going to set the design and performance standards for 3/4-yd. shovels and cranes during 1940 as it has in years past. It's ready and rarin' to prove it, too, on your next job. Write for catalog today.

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EXTRACTORS
HOISTS-DERRICKS
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**Special Equipment
Movable Bridge Machinery**

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Snow Removal Problems In South Dakota County

(Continued from page 1)

trunk highway systems, counties are limited in their snow-removal work by lack of funds. Especially is this true in North and South Dakota where the sources of highway revenue are few and only this past summer saw the partial reclamation of the drought-ridden plains. In these two states, county engineers have been hard pressed to find funds adequate for summer maintenance and construction programs. But, although the majority of the counties in the Dakotas do not remove snow from county roads, there is a growing public demand for open farm-to-market and feeder roads.

One of the typical counties answering the public request for snow-free roads is Lawrence County, South Dakota, with 350 miles of county roads and 15 miles of township roads. As long ago as 1925, Lawrence County started its first snow-removal work. Fourteen years ago the first roads opened were the main traveled county roads leading to the county seat of Deadwood. As the years passed, the public demand for more open roads increased until in the 1939-1940 season, all county and township roads with the exception of 24 miles will be opened.

Although much of Lawrence County is the mountainous country of the picturesque Black Hills, there are also many miles of county roads extending through plains areas. In the mountains, the snowfall seldom exceeds 10 feet a season, and it has not been uncommon on the plains area to experience an annual snowfall of 5 feet and more. There is very little drifting of snow in the mountainous sections, but on the plains high winds pile deep compact drifts across the roads. Control of drifting in this section is attempted, and with marked success, through the use of 20,000 feet of panel snow fence.

"Our biggest problems are the steep grades on mountain roads," George B. Lawler, County Highway Superintendent says. "The snow fence more or less controls the drifts on the level, but in the hilly country where the fence is of little help, deep snowdrifts pile up. We use Caterpillar graders with plows on the

mountain roads until the snow gets too deep, then we have to use Angledozer or V plows."

Superintendent Lawler is a firm believer in the speed system of snow removal. Lawrence County is not a large county, so equipment stationed at three central points is strategically located to clear storm-blocked roads in any section. The county employs 25 full-time workers, not drawn from relief rolls or the WPA but men experienced in the arduous work of snow removal in sub-zero weather. This force is divided into crews of two men each who start out immediately after a snowfall and work from daybreak until dark. Mr. Lawler considers it a blotch on his record if any county road, despite the severity of the storm, is blocked for a period of more than 24 hours.

The equipment used by Lawrence County in combatting winter's snows includes: one Dodge truck; four Caterpillar tractors; three V-plows; four Caterpillar motor patrols with plows; one Adams motor patrol with plow; and

20,000 feet of panel snow fence.

The prevailing county road in Lawrence County is a 20-foot gravel road. This is, of course, the old-type road with deep narrow ditches and steep backslopes. All new roads constructed in the county are of the streamlined snow-resistant design with a 24-foot width, high crowns, wide shallow ditches and gradual backslopes. The only trouble Mr. Lawler finds with the gravel-surfaced county road is that too much of the gravel is thrown off with the snow.

Weed Removal Helps

South Dakota county engineers generally feel that a good part of the snow-removal battle is won if the weeds, brush and grass along the roads and fence lines are cut and removed early in the fall. The last session of the South Dakota legislature passed the new "weed law" placing the obligation of weed removal directly upon the counties. Costs of weed removal run high, and yearly take a large slice of the snow-removal appropriation.

New Hydraulic Hoist

An addition to the line of Anthony low-loading-height hydraulic hoists and bodies has recently been announced by the Anthony Co., Inc., Streator, Ill. This new hoist is claimed to be a fast powerful low-pressure unit with the lift point well forward and centralized under the load. During the entire dumping operation, the arms lift vertically to the bottom of the body.

Low loading height, which is a standard feature of the Anthony line, is also a feature of this new hoist. The bottom of the box is only 11 inches from the truck chassis frame which is the minimum distance necessary for tire clearance. Another feature of all the 1940 Anthony models is a balanced valve which enables the hoist to be operated by button control on the dash.

Complete information on this new hoist, several models of which were exhibited at the A.R.B.A. Road Show in Chicago, may be secured direct from the manufacturer.

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Asphalt Expansion Joint



Cork Expansion Joint



Cork Rubber Expansion Joint



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Self-Conditioning Joint

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Serviced Self-Adjusting Joint

4. Recovery is aided by mechanical means ever-present and ever-functioning.
5. Uniform impregnation of the fibre with a non-sticky waterproofing material prevents adhesion of the fibre structure upon compacting.
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- Will cut through sand, gravel, soil, clay and broken rock in one operation.

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Brooklyn, N. Y.

New General Manager Appointed by Roebling

Charles G. Williams, formerly Vice President in charge of purchasing and manufacturing operations for the American Chain & Cable Co., has been appointed General Manager of the John A. Roebling's Sons Co., Trenton, N. J., and will assume his new duties on March 1.

Mr. Williams, a native of Hartford, Conn., is a graduate of Sheffield Scientific School, Yale University, and has been associated with American Chain & Cable since 1913. In 1930 he was made

a Director of the company and in 1936 became Vice President in charge of all manufacturing operations for its fifteen plants.

Hercules Powder Promotions

The Hercules Power Co. of Wilmington, Del., has announced the appointment of A. E. Forster as Assistant General Manager of the Explosives Department, and of A. R. Ely to succeed Mr. Forster as Manager of the Service Division of the Explosives Department.

Mr. Forster joined the Hercules organization in 1925 and has held a num-

ber of positions, for the past year having been Manager of the Service Division of the Explosives Department. Mr. Ely became associated with Hercules in 1920 and in 1937 joined the Explosives Service Division. Both Mr. Forster and Mr. Ely will continue to make their headquarters at Wilmington.

Building Your Own Welder

How to build your own engine-driven welder is the subject of a bulletin recently issued by the Lincoln Electric Co., Cleveland, Ohio, and outlines a composite plan based on the experiences

of hundreds of purchasers of a Lincoln welding generator and other parts who built their own portable engine-driven arc welders.

The engine, the base, coupling, governor, canopy, idling device, radiator, trailers, and welding generators are discussed, with illustrations and sketches to make the points clear. Photographs are also included of a number of such portable welding outfits.

Copies of this bulletin No. 427 may be secured by interested contractors and state and county highway engineers direct from the Lincoln Electric Co. by mentioning this magazine.

There's MORE pay-dirt in Rock...

WITH "CATERPILLAR" DIESEL EQUIPMENT!



There's real rock, and plenty of it, on this job being handled entirely with "Caterpillar" Diesel Equipment by Edward H. Ellis, of Westville, New Jersey! It's a new reservoir at Dauphin, Pennsylvania, a few miles north of Harrisburg. 24-hour operation, here. And these machines are taking it as well as handing it out!

Along with his "Caterpillar" Diesel D8 Tractors, Edward H. Ellis is using Athey wagons on his rock-hauling job near Harrisburg. Tracks under the load as well as under the power make for steady, sure going. And just for good measure, there's a "Caterpillar" Diesel Engine in the shovel!

HERE'S the power that can haul real profit out of rock! And it does it with a sparing use of low-cost fuel . . . with ruggedness and stamina that keep down the time and expense of repairs in spite of tough going . . . and with traction that lugs heaping loads over the bad spots and helps maintain a steady hauling-pace!

Those are the things that make men

who have had plenty of experience with rock strong for "Caterpillar" Diesel Equipment. They know it gives them fewer headaches on the job . . . and more profit when it's over!

CATERPILLAR TRACTOR CO., PEORIA, ILL.

Here's a man who makes the most of his low-cost, dependable "Caterpillar" Diesel Power! This D8 tractor, on the reservoir job near Harrisburg, is working 24 hours a day for Edward H. Ellis—driving a stone-crusher!



CATERPILLAR

DIESEL ENGINES • TRACK-TYPE TRACTORS • ROAD MACHINERY





The new Lorain-80.

New Excavator Fully Convertible

The new Lorain-80 1¾-yard excavator, recently announced by the Thew Shovel Co., Lorain, Ohio, is available with a complete line of interchangeable boom equipment for service as a shovel, dragline, crane, clamshell or back-digger.

The turntable of the Lorain-80 is built to the Thew center drive design and follows closely the design and construction principles of all Lorain machines. Its features are claimed to be simplicity of construction and ability to concentrate power entirely on one operation, or to spread it over two or three simultaneous and synchronized operations. The unit may be powered by a 6-cylinder Waukesha-Hesselman oil engine, a full diesel, a 6-cylinder gasoline engine or an electric motor of any standard type to meet the specifications.

The crawler base is a center chain drive crawler, 14 feet 1 inch in length and 10 feet 10 inches wide. It is equipped with 28-inch treads, or 34-inch treads are available if desired. The crawler has two travel speeds, of 1½ and ¾ mph. The unit may be steered in either direction at either speed. Other features of the crawler include complete enclosure and protection of the propelling and steering mechanisms, which run in an oil bath. Pressure lubrication is provided to all shaft bearings through

grease leads centralized at the front of the bed casting. A ratchet and double pawl provide a travel and safety lock, making it possible to lock the unit against travel in either direction or permitting travel in one direction while locked against travel in the other direction. On uphill travel, over either end of the crawler, a throw of the uphill pawl lever instantly engages the pawl to lock the unit against downhill movement.

The effective length of the shovel boom is 24 feet 8 inches. It is equipped with an 18-foot dipper stick. The shipper shaft is located at the center of the boom, providing the maximum horizontal and vertical reaches. The shovel boom is of all-welded all-steel design. The dipper stick is an all-steel all-welded structure, equipped with a spring-mounted greenhorn cap to eliminate impact shocks. The crowd rack is made in drop forged steel sections, of alloy steel, bolted to the stick. An automatic crowd brake, which automatically holds the stick extended

against back drift whenever the crowd lever is in neutral, and a power dipper trip requiring only a nudge of the operator's elbow to trip the dipper door, are additional features. Two long-range stripping shovel booms, one with a 25-foot boom, 25-foot stick and 1½-yard dipper, and the other with a 30-foot 6-inch boom, 25-foot stock and 1¼-yard dipper, are available.

Improved Apparatus For Welding, Cutting

The new line of Prest-O-Weld welding and cutting apparatus, recently introduced by The Linde Air Products Co., 30 East 42nd Street, New York City, after extensive field tests, consists of a welding blowpipe, cutting blowpipe and cutting attachment. They all retain the detachable-valve body construction of Prest-O-Weld, which permits quick changing from welding to cutting, and cutting to welding.

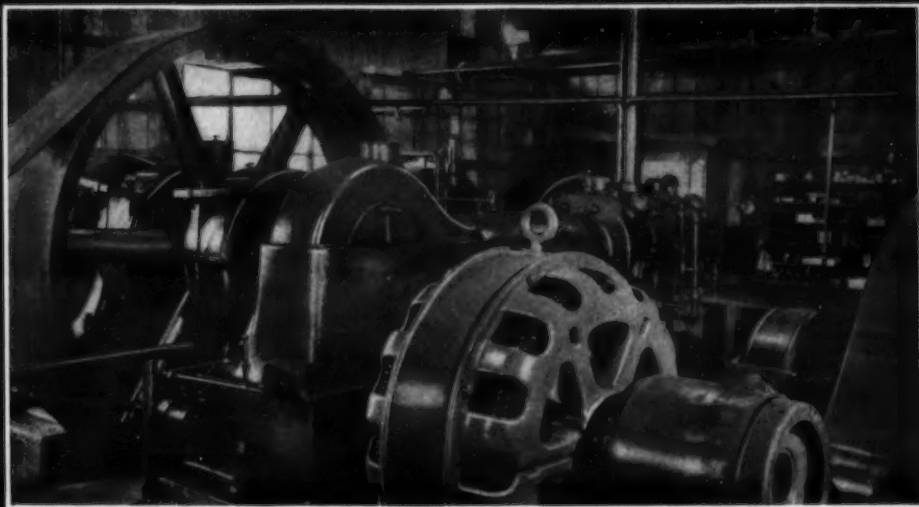
Among the principal features of the

W-108 welding blowpipe are the individual mixers in every head, making correct flame adjustment easy and giving definite resistance to flashback. Both the oxygen and acetylene for this balanced-pressure blowpipe may be set at approximately the same pressure in pounds per square inch as the number of the head. The new C-108 cutting blowpipe and the CW-108 cutting attachment are also constructed with improved design principles. A lower pre-heat oxygen pressure permits a large flame for cutting very dirty or heavily scaled material. Like the welding blowpipe, they have improved flashback resistance, are strongly built and are well-balanced for ease of handling.

This apparatus is available separately, or in combination outfits. In addition, since the new blowpipe handles can be used with detachable valve bodies already in use, owners of Prest-O-Weld apparatus can take advantage of these improvements very economically.

Complete information on this apparatus may be secured direct from Linde.

Compressor Valves STAY CLEAN



TWO-STAGE AIR COMPRESSORS with free-acting valves since being lubricated with Texaco Alcaid Oil • Other Texaco Oils in use here are Texaco Marfak, Texaco Crater Compound and Texaco Hypoid Lubricants, and, as the report further says, "with 100% satisfaction."

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- FINGER-TIP CONTROL of Loads up to 100 H.P. thru Giant Expanding Frictions or Clutches.
- ANTI-FRICTION BEARINGS, replacing babbit or bushings on all heavy duty models.

Combined All-Steel Side Frames and Base (60% stronger, hundreds of pounds lighter), Smoother Power, Silent Chain Drive, Sizes 4 to 100 H.P., Gas or Electric, 1 to 3 Drums.



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703 Dublin Ave., Columbus, Ohio

Hitting On All Six With A 27-E Paver

**Jos. D. Bonness Regularly
Laid 1,700 Feet of Slab In
12 Hours with Double Shifts
At Gotham, Wis.**

(Photo on page 44)

JOSEPH D. BONNESS did not let the fact that he was pouring a 9-6½-9-inch reinforced-concrete road 20 feet wide with a 27-E paver slow up his progress one bit from the start to the finish of 12.86 miles of new pavement laid last summer between Spring Green and Gotham, Wis. Every step was well timed to produce the best results most economically and without a lost second. One outstanding feature was his insistence that the base always be prepared two days ahead of the paver so that if a low spot was discovered in the previously laid grade it could be taken care of by filling in or a slight adjustment of grade well ahead of the paver, without holding up that machine one minute.

All Batching Subbed

From cars to skip the handling of the batches was in the competent hands of H. C. Westphal of Milwaukee, Wis. The gondola cars were unloaded on a siding, first at Spring Green for pouring the first 4 miles of the contract, and then at Lone Rock near the center of the job for paving the remaining 8.86 miles divided half east and half west. A Koehring 301 crane with a 45-foot boom and a ¾-yard Owen clamshell bucket kept the bins of the two Butler batching plants filled with the two sizes of gravel and sand. The cars were moved and spotted by a Caterpillar Thirty tractor.

A maximum of fourteen 2-batch dual-pneumatic trucks were used for hauling, with six of them being Macks belonging to the hauling contractor and the remainder hired locally. The batch weights for the job were: 1,657 pounds of coarse gravel, 1,102 pounds of fine gravel, 1,340 pounds of sand, and 620 pounds of cement. Both the contractor and the hauling contractor were rather proud of turning out, mixing and finishing 609 batches in 12.3 hours. Another rather remarkable piece of work was the changing of the material in the middle of a record day when 580 batches were turned out in 11½ hours. The stockpiles and bins were emptied and the new material started running right in the midst of the most active part of the day. The crane and tractor for the batching were owned by Westphal and the batching plants by Bonness.

Another piece of equipment not usually seen on a job of this type was a 2,000-gallon tank on skids set in the body of a Mack semi-trailer dump truck and used for sprinkling the grade where the trucks were close to town and in town where they had to use gravel or dirt roads. The town furnished the water free and the contractor did the sprinkling. Where it is necessary to haul in and stockpile the aggregates for a concrete job Westphal uses this 10-yard semi-trailer dump unit for that work.

At the cement dock a quarter mile nearer the grade, an unusual method of dumping, which is common to this paving contractor, was used. The usual dock was set up to serve two boxcars and there were two men in each car loading and two wheeling. To speed the handling of the buggies, there were two sets of Starr platform scales with grating platforms near the car doors. Then instead of the usual complicated dumping traps, depressed roadways and other schemes of those types, the hauling contractor graded the roadway so that the tops of the bodies came exactly even

with the edge of the platform and the trucks were driven in the same track close to the platform each time. Then it was a simple matter for the buggies to be pushed off the platform so that the wheels hit the top of the side of the batch truck and then swung over to dump. There was a remarkable absence of spilling with this very simple method. One of the men stepped onto the load and covered the cement with the sand of the batch to prevent loss from blowing.

Preparing the Grade

The contractor made a practice of keeping the rough grade high, as it drained much better in time of rain and the subgrader removed the excess material, leaving it on the shoulders where it was used later to complete



C. & E. M. Photo

This 2,000-gallon tank on a Mack truck trailer sprinkled the dirt roads and the grade used by the batch trucks, to increase speed and safety.

them. On sections where the black loam of the section predominated it was necessary to haul in 10 to 12 yards of sand per station and the reverse was true in sandy sections. At first it seemed that leaving further excess material between the forms was useless but the better riding quality of the grade for the trucks and the further improvement of

drainage made the method popular.

As soon as the grade stakes were set the Ted Carr Formgrader went up the line and cut the form trench for the Metaforms. The form-setting crew consisted of six men and a foreman, working as a head form setter, and a helper, two men on line and two cleaning the

(Continued on page 24)



More Alike than Peas in a Pod!



American Cable

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Uniform in Quality—is a universally acknowledged characteristic of American Cable's Wire Ropes.

Uniform in Service. Being uniform in quality American Cable's Ropes are naturally uniform in service. When American Cable introduced TRU-LAY Preformed, in 1924, we gave all industry a rope that far outlasted ordinary non-preformed, our own make included. Here, too, in increased service, is seen uniformity, for when one TRU-LAY Preformed Rope does a job unusually well, the second or twenty-second TRU-LAY Rope will do equally well.

Uniform in Safety. TRU-LAY Preformed is a safer rope. Its crown wires lie flat and in place so that there is less danger of their wickering out and jabbing workmen's hands, which often causes blood-poisoning. TRU-LAY handles easier and faster, resists kinking and whipping, spools on drums better and rotates less in sheave grooves. TRU-LAY requires no seizing when cut and will not fly apart when broken. Specify American Cable's TRU-LAY Preformed for your next line.

BUY ACCO QUALITY—whether in American Cable Division's Ropes—American Chains (Wood Tire Chains and Welded or Weldless Chains)—Campbell Abrasive Cutting Machines—Page Wire Fence—Page Welding Wire—Reading-Pratt & Cady Valves—Wright Hoists or any other of the 137 ACCO Quality Products.

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New York, Philadelphia, Pittsburgh, Houston, San Francisco

In Business for Your Safety



Handling Rock Cut On Penna. Turnpike

(Continued from page 2)

Amsco buckets, using about six trucks per shovel because of the slow operation of the hauling units on the excessive grades between the top of Clear Ridge cut and the high fill immediately to the west. In addition to the International, GMC and Mack trucks used, there were two 9-yard Linn tractor trucks and three Euclid 16-yard Trac-Truks. With this drilling, loading and hauling outfit, Corbisello moved 4,000 cubic yards a day under the worst conditions of excessive grades, and up to a fair average of 10,000 cubic yards when the cut went down and the fill came up. He worked three 7-hour shifts, using the spare hour after each shift for greasing the equipment.

Wherever the rock showed signs of being soft at all, Corbisello saved dynamite by putting in a LeTourneau Rooter pulled by a D8 tractor to break up the material and then loaded immediately with the Carryalls. This scheme was used by other contractors throughout the length of the Turnpike project.

Benching for Safety

This being one of the deepest cuts on the Turnpike, it serves as an excellent example of the methods used by the Commission to bench a cut to prevent rocks from near the top of the cut gaining headway and rolling down and causing severe damage or injury to passing traffic. From the bottom of Clear Ridge cut the rock is carried up on a 1 to 1 slope for a vertical height of 20 feet, then there is an offset berm 18 feet wide with a 10 per cent slope for drainage. The next 60 feet vertical height of rock is sloped at $\frac{3}{4}$ to 1, ending in a 15-foot offset berm also with a 10 per cent slope. Above this the rock slope is carried at $\frac{3}{4}$ to 1 until the overburden is reached. Above this the slope in earth is 1 to 1, with the standard slope treatment at the top. The 10 per cent slopes for the berms are carried to low points at the toes of the slopes, where paved drainage ditches are installed to carry off the water to the drainage system.

Lighting the Job

As the contractor worked right around the clock, it was necessary to have adequate lighting facilities which could be readily moved as operations shifted from one drilling area to another and as work on the fill shifted from one end to the other. Three 5-kw Kohler portable electric plants mounted on skid platforms beneath 18-foot wood towers were used to furnish illumination. Each tower carried three 1,000-watt lights and a spare, each equipped with Westinghouse or Crouse-Hinds reflectors.

The Adjacent Fill

The fill adjacent to and west of Clear Ridge cut has a maximum height of 95 feet and is spread to cover a 370-foot arch culvert having a 6-foot span and $3\frac{1}{2}$ feet high. This fill was a beehive of activity with the constant parade of



C. & E. M. Photo

A lighting tower with a Kohler portable electric plant used also for firing heavy blasts.

trucks, tractor trucks and semi-trailer hauling units across its broad flat surface. And in addition, to insure quick

spreading of the material in 8-inch layers, a D8 tractor with a LeTourneau bulldozer, an Allis-Chalmers Model K tractor with a Baker bulldozer, and a No. 10 Auto Patrol were constantly busy, followed by four 12-ton Buffalo-Springfield rollers compacting each layer as spread. Six to ten laborers were used to hand-sledge all oversized rock, reducing it below the 8-inch specified maximum size.

Personnel

On Contract 27, Section 13-E, N. R. Corbisello of Binghamton, New York, acted as his own Superintendent on the large grading operations at Clear Ridge cut and the adjacent fill, while George Brayman was Superintendent at the bridge and other structure operations on the contract. J. I. Hepner was Resident Engineer for the Pennsylvania Turnpike Commission on this section, which had a total length of 5,076 feet.

Want information on equipment?
Write the Editor.

A New Small-Size Heavy-Duty Clutch

At the exhibit of the Twin Disc Clutch Co., Racine, Wis., at the A.R.B.A. Road Show there was displayed for the first time the new Model CL smaller-size heavy-duty clutch. This is a new unit designed to meet the need for a heavy-duty enclosed-type clutch for power transmission installations of many types, including shaft couplings, pulley drives, and use with driving spiders, carrying gears, sprockets or pulleys.

This new clutch is built in sizes from $5\frac{1}{2}$ to 16 inches in diameter, and like all models of Twin Disc clutches, full adjustment can be made from a single point.

Complete information on this and other clutches in the Twin Disc line, as well as the Twin Disc reduction gear unit which consists of a complete power take-off and reduction gear assembled into a single sturdy unit, may be secured direct from the manufacturer by mentioning this magazine.

Positive traction, positive protection with Walter 4-Point Positive Drive



Get behind the wheel of a Walter Snow Fighter and ram it full speed into a heavy snowdrift that you know will stop anything else on wheels. Be prepared for a surprise, for you will be driving the best combination of traction, AVAILABLE power and ruggedness that has yet been built.

Only Walter Four-Point Positive Drive can give you that extra margin of traction you need for heavy snow fighting. Don't confuse it with ordinary four-wheel drive. It is that, of course, plus all the certainty of traction that can be given by the peculiar Walter features, found in no other vehicle. The panel at the right lists a few of these distinctive Walter points of superior design. Send for literature that describes them in detail.

And don't forget that the features that make the Walter the best of all Snow Fighters also make it a mighty useful truck for year round road maintenance and for any other tough job on the calendar.

WALTER FEATURES

Torque-Proportioning Automatic Lock Differentials.
Suspended Double Reduction Drive, with Low Unsprung Weight and High Ground Clearance.
Ten to One Range Transmission with Five Forward Speeds of High Efficiency.
Single Lever Control, Giving Fast High Gear and Very Powerful Low Gear for All Emergencies, with Proper Intermediate Ratios for All Operating Conditions.
Four Heavy Duty Internal Shoe Brakes, Protected from Mud, Snow and Ice. Where Required, Another Pair of Heavy Duty Shoe Brakes at Rear Wheel Hubs Is Provided.

COMPLETE
WELL POINT SYSTEMS
WILL DRY UP ANY
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1001-19 IRVING AVENUE, RIDGEWOOD, QUEENS, L. I., N. Y.

Two Spans Included In Corbisello Job

(Continued from page 2)

passed by a channel change, for which the contractor was not paid, but since this channel change made it possible to do all of the excavation for footings in the dry it was an excellent investment. A shovel was put in at the downstream end, excavating an average depth of 8 feet for the 15-foot wide footings and for a distance of 328 feet.

Abutments, Falsework and Forms

The two abutments of the structure are identical, being 16 feet wide x 320 feet long. Between the abutments, the pile falsework for the arches was set on mud sills on the shale and well cross-braced, being spaced 4 feet lengthwise and 8 feet across on the skew of the arch. This falsework, composed of 6 to 8-inch saplings, was capped with 8 x 10-inch or 6 x 6-inch double lumber lengthwise and plated on either side for greater stability. Then segments of 3 x 10's spaced 16 inches on centers were set up on the proper slopes to form the chords of the arch and then capped with carefully cut arch segments to give the accurate shape to the 5/4 x 6-inch ship-lap form lumber which was laid horizontally across these arch segments. The form lumber was not lined with plywood.

For the outside forms concave templates were used and the same sizes of lumber. Double 2 x 6 wales with metal ribbon ties were used and wooden spacers were inserted between the forms and knocked out as the concrete was poured.

The arches were reinforced close to the inside and outside faces with 1-inch round deformed bars spaced 12 inches apart and tied to longitudinal bars of the same size which were spaced 2 feet on centers.

Concreting

The aggregates and cement were dry-batched 4 miles from the site of the bridge and hauled by truck, two or three batches to the truck, and mixed by a new MultiFoote 27-E paver located at the east end of the structure. A Speedcrane with a 70-foot boom handled the Wiley 1-yard bucket, lifting it from the paver chute to two hoppers located at the east end of the bridge structure, into which the bucket was emptied, and then delivered the concrete to the three CMC rubber-tired buggies on each arch. The concreting crew consisted of a man dumping the batches, the paver operator, a spotter at the paver chute, the crane operator, one man on each of the receiving hoppers on the structure, three buggy men, one man aiding in dumping the buggies at each of the four delivery hoppers equipped with tremies, and five men in the forms rodding, including the vibrator operator. Pouring was usually handled at four holes at one time, and with this outfit it was possible to pour an average of better than 27 cubic yards of concrete per hour.



C. & E. M. Photo

The southerly barrel of the 52-foot arch bridge, showing the falsework, placing of forms, reinforcing and pouring the far section.

Matters of Procedure Under Govt. Contracts

Firms and individuals who enter into contracts with the Federal government

for construction work of any description, or for furnishing supplies, must comply with the terms of their contracts and with certain rules and regulations issued by the departments or establish-

ments concerned which, if in accordance with law, have the force and effect of law, as well as with the laws governing such matters as declared in the statutes, decisions of courts, and decisions of United States accounting officers.

"Matters of Procedure Under Government Contracts" is an 80-page booklet prepared by O. R. McGuire, until recently counsel to the Comptroller General of the United States, covers the wide variety of subjects involved in government work, such as bids, contracts, contracting agencies, and settlement of claims under Government contracts. This book, which is the third edition of this work, answers practically all the questions which contractors may want to ask, and will aid materially in avoiding misunderstandings and court disputes.

Copies of "Matters of Procedure Under Government Contracts" may be secured by readers of CONTRACTORS AND ENGINEERS MONTHLY without cost or obligation by writing direct to the Fidelity & Deposit Co. of Maryland, Baltimore, Md., and mentioning this item.



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Now you can handle light ditching, grading, maintenance and construction at lower costs than ever before... with the Allis-Chalmers W-Speed Patrol. It's powerful and rugged enough to recover gravel from ditches 30 inches deep... or cut 2-foot ditches in average soil conditions. Handles most maintenance work at 3 to 5 miles per hour. Ideal for cutting sod from road shoulders... for leveling fills... for finishing work. Trims backslopes—as steep as 2:1. Compact design and short turning radius enables it to work on narrow back roads... between forms... other close quarters. Can be fitted with plow for snow removal. Drawbar always free for pulling road disks, harrows, mowers. Belt pulley available for operating rock crushers, pumps and other tools. First cost is \$500 to \$1500 less than other comparable units—made possible by Allis-Chalmers money-saving mass production of engines.

Take advantage NOW of the big savings provided by this new, lower cost W-Speed Patrol. Ask your Allis-Chalmers dealer to show you... on your own roads... how it will make your money go further.

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- ✓ Fuel Consumption 1 — 1 1/4 Gals. Hourly
- ✓ 10-Foot Tilting Moldboard

W-Speed Patrol Handles Light Ditching and Grading; Maintenance of Airports and Parkways; Maintenance and Patching on Oil Mix; Construction and Finishing Work on Streets, Playgrounds, Parks and Airports; Snow Removal and Terracing... at Costs That Seem Unbelievably Low.



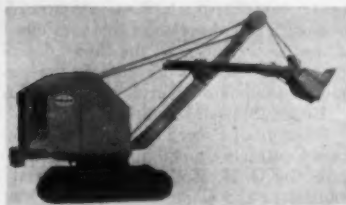
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COST..
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The new Insley Type K excavator.

Improved Excavator Displayed at Show

After exhaustive tests, an improved Type K excavator was presented to the contracting field at the A.R.B.A. Road Show by the Insley Mfg. Corp., Indianapolis, Ind. One of the features of this new machine is the independent chain crowd on the shovel which gives greater crowding pressure and faster retraction.

Efficient internal expanding clutches minimize the internal friction and deliver all of the engine's power to the pull of the rope. Larger clutches on the hoist drum and digging drum are claimed to have 42.5 per cent greater friction area and 65 per cent increased efficiency, while the larger clutches on the swingers have 20 per cent greater friction area and 30 per cent increased efficiency, according to the manufacturer.

Another feature of this new Insley machine is the larger brakes with a high ratio brake operating mechanism. Longer life is provided through an improved pressure lubrication system and the fully enclosed horizontal gears running in an oil bath. Crawler driving gears have also been enclosed and run in oil.

The operation of the complete line of readily interchangeable attachments has been improved by a reversible two-speed front drum. The high-speed dragline has a high line pull and a differential line speed for crane work which provides hoist line speeds between 51 and 143 feet a minute with a single manipulation of clutches. The trench hoe is said to have a 75 per cent increased line pull, and a new type of chain crowd skimmer attachment with power retraction is provided for that type of work.

A new system of mechanically controlled cab temperature and ventilation is provided for operator comfort in all types of weather. The cab has been planned so that the operator can control the amount of air entering the cab from the radiator and enables him to rid the cab of hot stale air at will.

Complete specifications on this new Insley Type K excavator may be secured direct from the manufacturer by mentioning this item.

Center Scraper Plow To Remove Ice Ruts

A new piece of equipment for eliminating the hazards of packed snow and ice ruts has been announced by the Four Wheel Drive Auto Co., Clintonville, Wis. The manufacturer states that an entirely new principle of construction has been applied to this new FWD center scraper plow. The entire plow unit is carried on sprung weight; none of the weight or shock from the plow is taken directly by the driving axles. This feature is designed to increase the speed at which the plow may be operated, permit more efficient work, and protect both the driving mechanism of the truck and the blade from damage from excessive road or impact shock.

A positive automatic tripping feature allows the blade to slip over solid obstructions, such as manhole covers, tracks or other projections in the pavement. This tripping feature and kick springs which apply tension when the blade is in operation cushion the blade against excessive load.

Cutting pressure is maintained on the

plow by two hydraulic rams, one on each side of the truck frame. This pressure is transferred to the scraper blade through a sturdy bell-crank arrangement operating against a coil spring connected to the bell-crank and the push frame of the plow. With the ram operating at its maximum angularity, the coil spring is at 80 per cent of full compression, allowing the push frame to raise should the blade strike an obstruction in the pavement which might not be cleared by the tripping action of the kick springs. The operation of the rams may be arranged through bi-valves that operate at parallel, thus providing equalized hydrostatic pressure to each ram so that the blade will exert an equal pressure on the road regardless of its contour of irregularities, or the valves may be arranged so that the amount of pressure to each ram is regulated at the will of the driver, allowing him to apply more pressure to one end of the blade than on the other.

Extra high road clearance is provided even when the blade is raised after op-



The new FWD center scraper plow.

erating at its maximum angularity. A special push frame extends from the turning circle of the plow to the rear end of the truck frame. At this point the long push frame is connected to a special bracket attached to the chassis frame by a heavy compression spring which also serves to minimize road shock. When the blade is operated at an angle, the leading edge and trailing edge of the blade are raised nearly uniformly for clearance.

The mechanism of the new FWD cen-

ter scraper plow is arranged so that control valves may be located under the skirting of the truck, and none of the operating mechanism of the blade protrudes above the top of the frame.

Airport Drainage

This is the title of a new 16-page booklet on the subject of subsoil drainage for airports, recently issued by the Clay Products Association. The subjects covered include the need for airport drainage, planning drainage for airports, subsoil drainage, the installation of subdrains, surface drainage, capacity and size of drain pipes, and the features of vitrified clay pipe as airport subdrains. The booklet is amply illustrated by photographs and diagrams.

Copies of this booklet "Airport Drainage" is available free to interested contractors and state and county engineers direct from the Clay Products Assn., 111 West Washington St., Chicago, Ill., by mentioning CONTRACTORS AND ENGINEERS MONTHLY.

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All-Welded Bridge Speeded Airport Job

Floating Swing Span of Unusual Type Was Built To Carry Materials for New York's New Airport

By ERIK H. METHLIE, Vice President, and ROBERT H. FREEMAN, Engineer, The J. K. Welding Co., Inc., New York City

† CONSTRUCTION of the bridge between Riker's Island and the North Beach section of Astoria, New York City, to permit transportation of fill material for the new La Guardia Airport for New York City, involved many novel features, among them an all-welded floating structure pivoted at one end and arranged to swing around, thereby allowing the passage of ships through a navigable channel.

Plans for this structure were required to meet the approval of the War Department and the American Bureau of Shipping, and the work was to be completed in 30 days, with a penalty of \$250 a day beyond the contract limit. The J. K. Welding Co., Inc., of New York City, prepared plans for an all-welded structure which met all of the specifications and submitted its bid, which proved to be low and the contract was awarded to that company.

Structural Details

The hull of the bridge was shaped like a rectangular box, with the sides beveled off at the bottom. It was 233 feet 9 inches long, 29 feet wide, and 10 feet deep. The depth was to provide the specified elevation of the roadway 8 feet above the level of the water. To reduce the resistance of the flow of the tide and to allow the bridge to swing more easily, the side of the hull at the bottom was knuckled 15 inches above the bottom straight to a point 30 inches in from the side. Seven steel watertight bulkheads divided the hull into eight compartments, seven of these being 30 inches long and the end space 23 feet 9 inches to house the winch.

The deck bottom sides and bulkhead plating were 1/4-inch thick. Longitudinal frames on the deck and bottom were combined with vertical frames on the sides and bulkheads. Each deck and bottom longitudinal frame was supported by means of diagonal struts forming an open truss from bulkhead to bulkhead. The vertical side frames were extended at the deck and bottom and welded to the first longitudinal frames. These frames and struts were 4 x 4 x 1/4-inch angles. Flat bars were fitted between the deck angles under the traffic plates.

The same size fore and aft deck and bottom frames were fitted in the winch compartment. Diagonal struts from these to the bulkhead and end tied in to transverse plate web frames, forming the foundation for the winch. Vertical webs at the sides and horizontal webs under the deck combined with the bottom webs formed continuous deep girders around the hull. The wire rope sheaves and roller fairleads were housed in box-like steel-plate structures at the sides of this compartment. Checker plate flooring welded to the bottom web frames formed a working platform all around the winch. Access hatches with welded ladders and hand-rails were provided.

Pattern steel plates 30 inches wide and 1/2 inch thick welded onto the 1/4-inch deck plating formed running strips under the wheels. A side guard plate 30 inches wide and 1/4-inch thick was fitted at each side of the roadway and was supported by 1/4-inch plate brackets spaced 2 feet apart, all welded to the deck. A 2-foot high diversion plate was

fitted at the center to prevent trucks from running off the running strips. Half-round bars fitted at the top of these vertical guard plates finished the roadway structure.

The Swing Mechanism

A bracketed structure at each end of the hull for supporting the hinged ramps connected the floating bridge to the trestle roadway. Locking devices were fitted to prevent any rolling motion of the float, causing a separation with the ramps. A heavy plate structure fitted at one end formed a pivot hinge, being designed to fit around a 24-inch diameter steel pile which acted as a pivot pin. The entire bridge swung about this point.

At one side of the roadway on the



The floating span bridge section, a hull 233 feet long, 29 feet wide and 10 feet deep.

winch end of the bridge was an elevated steel structure upon which was mounted the control levers of the winch. This operating platform, which was of steel angle construction with a steel pattern plate flooring, gave the operator an un-

obstructed view of the bridge.

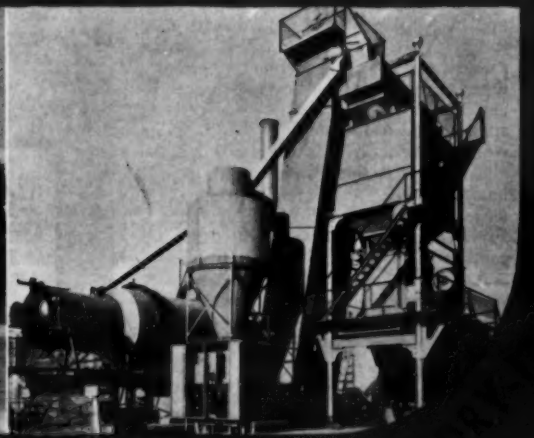
Fabricating the Structure

The bottom plating was placed on the blocking with all laps and butts of (Concluded on page 30)



19

40



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SIMPLICITY

THE SIMPLICITY SYSTEM COMPANY, Chattanooga, Tenn.

DEPENDABLE

Deep Cuts and Long Fills Feature Pacheco Pass Job

(Continued from page 1)

tractor reported "That machine pays dividends in lower maintenance on all the other equipment."

Other cuts on the job were handled in a similar manner with the same equipment. There was one 80,000-yard cut and others of lesser yardage. The total contract yardage of 500,000 yards for the job included a small allowance for slides.

The basalt and some softer rock was drilled with Worthington and Gardner-Denver wagon drills, using 2½-inch steel for starting the holes and running up to 18 and 20 feet deep. Air was furnished by a pair of Gardner-Denver diesel-powered 360-foot compressors. Oversize rock was drilled with six Ingersoll-Rand jackhammers, and shot. Hercules 60 per cent dynamite was used for springing the wagon-drill holes, and Hercules bag powder fired with a stick of dynamite was used for the major shots.

The rock was loaded to a fleet of two to ten rented trucks, as required for the haul, by a 2½-yard Northwest shovel powered with a Murphy diesel engine, and a Bucyrus-Erie diesel-powered 2-yard shovel.

Structures

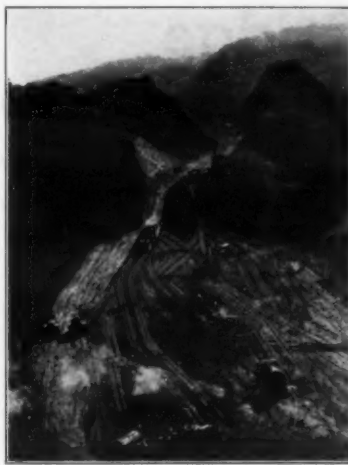
The major drainage structures on the work included six arch culverts and two concrete bridges. The culverts vary in size from two 105-square foot, two 60-square foot, to a 90-square foot and a 44-square foot. The 44-square foot culvert is 244 feet long and carries 70 feet of fill, measured from the footing. In placing the fill over these culverts, it was packed tight up to the top of the arch, using a power roller as close to the concrete as possible. Special care was taken at the spring line to prevent spreading of the arch as the load of the fill increased.

One of the bridges is located just west of the large cut described above and carries the highway over the South Fork of Pacheco Creek. It consists of three spans and a cantilever at one end to the approach fill. It is a rigid-frame structure with a 26-foot roadway from curb to curb and with the foundation carried down to rock. The cantilever span at the east end is 14 feet, with the successive spans being 44, 44 and 33 feet to the west abutment.

The second bridge of the same type has cantilever spans at both ends and variable spans for the entire structure. From east to west the spans are 22-foot cantilever, 67 feet, 58½ feet, 50½ feet

and 17-foot cantilever. The piers are 1 foot 4 inches thick at the footings and 2 feet 3 inches thick at the top or base of the beam. The roadway deck is 7 inches thick.

Concrete for the structures was mixed in a Jaeger 3-bag machine and then lifted to the bridge piers and deck with one of the pair of 1½-yard Northwest draglines which were also used with Northwest dragline buckets for ditch work. For the culverts the concrete was hauled in buggies and run down to the forms through elephant-trunk chutes. Water for the concrete was hauled in a pair of 1,000-gallon tank trucks, equipped with sprinklers so they could also be used on the fills, and delivered to the mixer by a 1-inch Jaeger pump. A 6-inch Jaeger was used to unwater the footings and a 3-inch pump filled the



Scraper and rolling activities at the largest cut on the Pacheco Pass contract.

tank trucks from the creek. All aggregates were weighed for proper propor-

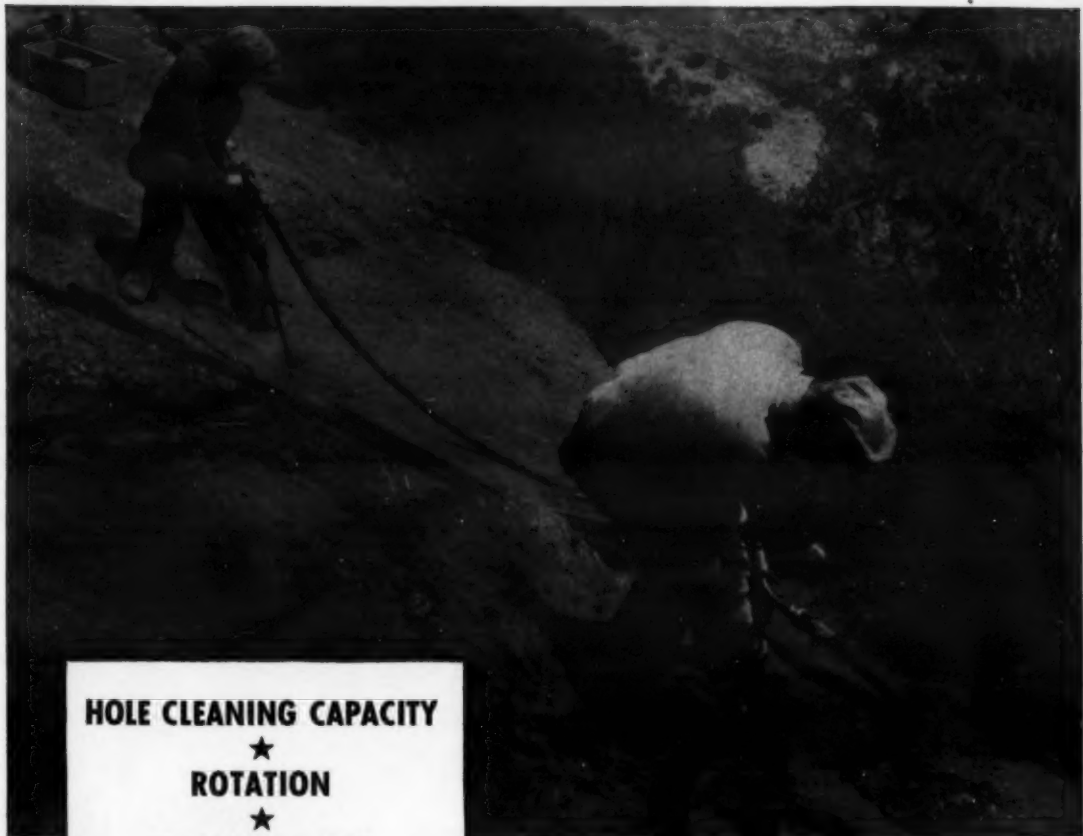
tioning on C. S. Johnson wheelbarrow scales. Rubber-tired wheelbarrows and buggies were used throughout as a saving in labor and to speed the work. Both barrows and buggies were supplied by Edward R. Bacon Co. of San Francisco. All bridge and culvert concrete was placed with a Viber No. 12 electric vibrator to prevent honeycomb and to insure close contact with the reinforcing steel.

Aggregate Production

Concrete aggregate as well as the material for the 8-inch crushed gravel base was supplied by the contractor's A-W crushing and screening plant powered with a Cletac engine. Gravel was found in abundance in the creek and was loaded by a Lorain 40 shovel to Chevrolet trucks for hauling to the plant. At the hopper a reciprocating feeder supplied the material to a belt conveyor carrying the gravel to the screens. These vibrating screens reject all material over 2½-inch and produce ¾ to 1½-inch, and

(Continued on next page)

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The fast drilling speed of CP-42 Sinker makes it ideal for quarry drilling, road work and general excavation. Note how the CP-42 Sinker blows a hole out and keeps it clean. Observe its better rotation. Check the air consumption—and the low maintenance. Try it, job for job, against any sinker in its class and you'll find there isn't a better all-around performer. The CP office nearest you will be glad to arrange for a demonstration of CP-42 or any other CP Sinker on your own work, under your own conditions. Write for a demonstration.

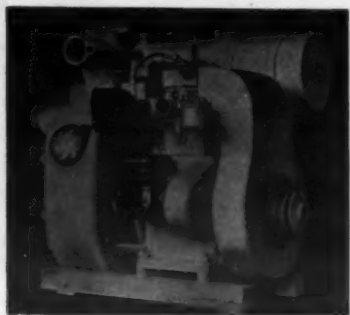
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Ask for Bulletin 22-W

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Ridgewood

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California Route Realigned, Paved

(Continued from preceding page)

1/2 to 3/4-inch stone for the armor-coat road surfacing. The rejected stone was all crushed to 2-inch size in a 4-inch crusher for the gravel base.

Road Base and Surfacing

The roadway constructed as a part of this contract consists of a 22-foot base of crushed gravel, a prime coat and an armor coat. Two 7-foot shoulders were built with penetration oil treatment with from 4 to 8 inches of the base-course gravel under the shoulders. The ditch slopes are 3 to 1, 2 feet wide at the bottom and with a 1 to 1 backslope.

The top of all earth cut slopes was rounded for 5 feet back from the intersection of the top and side tangents. On fills the gravel base was carried up the berm for erosion protection and the penetration oil treatment applied on the 1 1/2 to 1 slope of the 2-foot shoulder. The side slopes are 1 1/2 to 1 on all fills.

Major Quantities and Labor Hours

The major quantities and unit prices on this contract were as follows:

ITEM	Quantity	Unit Cost
Clearing and grubbing	139 stations	\$50.00
Water	3,500 thousand gal.	.73
Roadway excavation, unclass.	500,000 cu. yd.	.41
Overhaul	1,000,000 sta.-yd.	.094
Excavation, structure	6,500 cu. yd.	1.50
Excavation, ditch and channel	2,200 cu. yd.	1.00
Finishing roadway	139 stations	5.00
Gravel base	16,000 cu. yd.	1.55
Liquid asphalt, 90-95 armor coat	115 tons	15.00
Liquid asphalt, SC 1-A, prime coat and penetration treatment	90 tons	12.50
Liquid asphalt, SC-2, penetration oil	30 tons	13.50
Screenings, armor coat	1,275 cu. yd.	3.00
Sand, penetration oil treatment	130 cu. yd.	3.00
Reinforcing steel	409,000 lbs.	.94
Portland cement concrete, Class A, structures	2,685 cu. yd.	19.50
Portland cement concrete, Class A, footings	130 cu. yd.	17.00
Portland cement concrete, railing	26 cu. yd.	50.00
Corr. metal pipe, 8-inch	300 ft.	1.00
Corr. metal pipe, 18-inch	1,100 ft.	2.00
Corr. metal pipe, 24-inch	200 ft.	3.00
Corr. metal pipe, 24-inch double riveted, 12-gage	320 ft.	4.00
Corr. metal pipe, 30-inch double riveted, 10-gage	720 ft.	5.50
Perforated metal pipe, 8-inch	350 ft.	1.00

Work was started on this contract on November 15, 1938, with the contractor allowed 270 working days to complete the work, exclusive of Sundays and holidays. This made the completion date October 7, 1939. At the start of the work the contractor used two 8-hour shifts from 4 a.m. to 9 p.m. and later this was reduced to one daylight shift of 8 hours.



Typical scraper operations on the Pacheco Pass Job of Granfield, Farrar & Carlin in California.

When working the two shifts on the heavy excavation, the work was lighted at night by a Kohler portable 1,500-watt electric plant with pipe standards pushed into the ground and with one light equipped with a "wash bowl" reflector.

Personnel

The contract for the grading and surfacing of 2.6 miles of California State Highway 152 in Pacheco Pass was awarded to Granfield, Farrar & Carlin of San Francisco, Calif., on its low bid of \$355,732. The job was opened No-

vember 15, 1938, with John Carlin in charge until he left to take charge of the contractor's contract for the relocation of the Southern Pacific railroad line at the site of Shasta Dam in northern California. Then the work at Pacheco was handled by J. J. Granfield. Carl Gilger was Superintendent for the contractor throughout the work. For the California Division of Highways, the work was in charge of H. S. Payson as Resident Engineer, under the general supervision of J. H. Skeggs, District Engineer.

Automatic Dragline Buckets

Complete information on Page automatic dragline buckets, a feature of which is the patented rounded-front design which forces these buckets to use all of their weight most effectively for digging at any depth, and which are claimed to increase yardage from 15 to 30 per cent, is contained in literature which may be secured from the Page Engineering Co., Clearing Post Office, Chicago, Ill.

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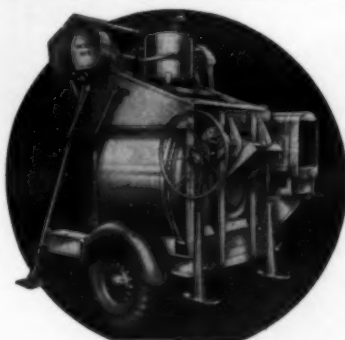
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THE JAEGER MACHINE CO.
701 Dublin Ave., Columbus, Ohio

Highway Organization In Michigan County

**Ottawa County Maintains
State, County and Township
Roads; Has Annual Snowfall
Of More Than 5 Feet**

(Photo on page 44)

♦ WITH a total of 1,490 miles of roads to maintain in an area of 564 square miles, the activities of the Ottawa County Highway Department with GHQ at Grand Haven, Michigan, offers an interesting study. Located at the dividing line between the northern and southern tiers of counties, it has a "light" snowfall with a minimum of 61 inches and running as high as 132 inches.

Organization

The County Road Commission of three men is appointed for six-year terms, one man being appointed each alternate year. The Supervisors, who appoint the members of the Commission, are elected annually. In the twenty-eight years of the life of the Commission there have been only ten different men on the Commission. The Commissioners do not have active charge of districts but control the policy of the County Highway Department at the semi-monthly meetings. The work of administering the work is left entirely to the County Engineer.

Acting under the County Engineer is the Maintenance Superintendent who is in full charge of equipment and maintenance. Under him are three foremen, one for each of the districts into which the county is divided for convenience of operation of the department. There is a central garage in charge of one of the foremen and two other garages, one at Coopersville in the northern section of the county and Zeeland in the southern section. The central garage is at Grand Haven, the county seat.

The engineering staff directly under the County Engineer consists of an Assistant County Engineer in charge of all WPA projects and all construction; an Assistant Engineer for following up the field work; and an Office Engineer who handles the paper work in connection with the WPA projects, and other county highway activities.

The County Road Commission is also the County Park Board and expends the funds appropriated by the Board of Supervisors for the County Park and those received from the concessions operated in the park.

Finances

The funds received for the operation of the County Highway Department are received entirely from the state weight and gasoline taxes, with the exception of some specially voted money from the township boards. During 1938 the county received \$228,989 from the vehicle weight taxes returned to the county by the state. From the gasoline taxes, \$2,500,000 of which are returned to the counties in the same ratio as the weight taxes, Ottawa County received \$30,932.97. Additional funds received from the state included \$6,299.78 for snow removal under the law that furnishes additional money to those counties where the snow fall is greater than 60 inches. The other money received came from the McNitt Payments which are made from the gasoline taxes for use by the county on township roads based on a mileage and population ratio. Beginning in 1932, the counties of Michigan were required to take over 20 per cent of the township roads each year and this money is an added fund to assist in the upkeep of these added miles of road.

There is no real estate tax for high-

way work in Ottawa County but some of the townships have collected small millage taxes on real estate amounting to a total of \$1,000 to \$2,000 in a township to match county funds for use in that township. In 1938 a total of twelve townships did this and furnished a total of \$12,352.97 by vote of the electorate at the April election. This money was used in the townships where voted to grade, gravel, apply prime and seal on gravel, building black-top surfacing and building two bridges. The labor and trucks for these projects were usually hired within the township concerned. WPA labor was used on only two of these projects.

The sum of \$67,816.95 was paid from the second half of the weight and gas-tax receipts from the state as required for



Carl T. Bowen, County Engineer, Ottawa County Highway Commission.

the retirement of bonds and interest.

Another receipt in 1938 was the sum of \$10,000, and \$15,000 in 1939, from

the Board of Supervisors from general county funds to be used to grade and gravel a county road north from Coopersville to the Muskegon line, the money in 1939 being used to black-top the same road. This road connects with a similar road in Muskegon county and thus furnishes a new outlet for the northeastern section of the county. In 1938 the WPA projects executed in the county under the road department amounted to \$229,000 which were used to take men off of township direct relief. The \$10,000 from the general county funds was used as part of the county highway department's share, or sponsor's share, for this work.

Since such a large portion of Ottawa County is unincorporated, the county really receives about 48 per cent of the second 50 per cent of the weight tax and gas tax money returned to the county. This must be used first for debt payments, and then split among the cities, towns and villages in accordance with the population.

The major disbursements during 1938

(Continued on page 36)

LOW-COST GRADER WITH EVERY BLADE POSITION POSSIBLE

Low cost in both initial investment and in daily operation. That's the New Galion No. 201 motor grader designed to provide a unit of intermediate weight and power . . . with the ability to do many things which you would ordinarily expect from a heavier or higher-priced machine.

Full revolving circle permits of blade adjustment in all working positions (see photos right and bottom). Powered by a 46 H. P. gasoline engine, the No. 201 has all the features of the big Heavy Duty, diesel-powered model we announced early last year. Full hydraulic control provides effortless, fingertip operation.

Send for Bulletin No. 248 which gives specifications covering the No. 201 motor grader.

THE GALION IRON WORKS & MFG. CO.
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We call your particular attention to the illustrations so that you can see for yourself just what blade positions are possible with the No. 201 motor grader. While this is a light weight unit, it does all the operations in heavy road building and construction usually considered work for pull graders. Look into the merits of this low-cost, gasoline-powered grader.

201





The new I-R JMA Jackmill.

Reconditioning Mill For Detachable Bits

A new machine has recently been developed by the Ingersoll-Rand Co., 11 Broadway, New York City, for reconditioning its detachable rock-drill bits known as Jackbits. This hot-milling machine is built in two sizes: the JMA which redresses 110 to 180 Jackbits an hour, and the JMB which redresses 75 to 90 Jackbits an hour. Both machines are equipped with electric-motor drive, but the feed mechanism of the JMA is air-operated.

Each of these Jackmills has a single cutter which does both gaging and sharpening. The cutter of the larger mill will redress 40,000, to 60,000 bits, and the cutter of the small mill will handle 15,000 to 30,000 bits before it needs re-sharpening, according to the manufacturer, who states that, inasmuch as these cutters can be reconditioned a number of times, the cutter cost per Jackbit sharpened is less than one-tenth of a cent. Another feature is the fact that due to a slight flow of metal during the milling operation, it is possible to maintain the bit's gage size longer, thus increasing the life of a Jackbit from 30 to 50 per cent.


Details of these new machines and their cost-cutting features are contained in an illustrated folder, Form 2579, copies of which may be secured direct from the manufacturer or from this magazine.

New Diesel Included In Dodge 1940 Line

Among the new models for 1940 being offered by the Dodge Division, Chrysler Corp., Detroit, Mich., is a new diesel-powered 3-ton truck which the manufacturer states is the result of 11 years of diesel-engine research and experiment. The engine is the full-diesel type, using the compression ignition principle, and develops 100 bhp at its governed speed of 2,600 rpm.

This Dodge diesel truck, which has an unusually wide speed range and pulling ability, is available in four wheelbase lengths of 152, 170, 188 and 205 inches, providing chassis lengths to accommodate bodies for all types of hauling work.

Also new in the Dodge line for 1940



**1889
Pence
CORRUGATED
METAL
CULVERTS**

Easily installed—no delay and no maintenance. Guaranteed to meet U. S. and State Highway Specifications.

**Durable . . . Permanent
Low Cost**

Phone or write
PENNA. METAL CORPORATION OF PENNA.
Oregon, 2nd & Swanton Street, Philadelphia, Pa.

are the VM series 1½-ton cab-over-engine and VMA series dual-purpose cab-over-engine models, which are available in wheelbase lengths of 105, 129 and 159 inches. Identical except for the rear axles, these new trucks are powered by the Dodge 6-cylinder L-head truck engine developing 92 hp at 3,000 rpm. The VM series has a full-floating rear axle with hypoid gears and the VMA is equipped with a two-speed full-floating rear axle with a planetary reduction gear between the bevel gear and differential.

Three Sizes Added to Line of Truck-Mixers

The addition of 3, 4 and 5-cubic yard sizes has recently been made to its line of Smith-Mobile truck mixers and agitators by the T. L. Smith Co., Milwaukee, Wis.

The Smith-Mobile is equipped with a large feed chute located at the high end of the drum. Since the drum re-

volves during the charging operation, shrinking and mixing begin as soon as the materials enter the drum. Water is introduced through the drum-charging opening. A high-pressure turbine-type water pump is supplied regularly as standard equipment.

This unit has an unusually high discharge which permits a larger radius of spout distribution. This feature is claimed to eliminate the need for ramps when the concrete is discharged into hoppers or high forms. The discharge door can be opened wide to permit inspection of the batch while the drum is revolving.

For discharging the batch, the operator merely reverses the direction of the drum. Even when the door is wide open, the operator can obtain either slow or fast discharge, as desired, by operating the clutch lever. Dual control levers are banked for operation from either platform or the ground.

Other Smith-Mobile features include the welded Man-Ten steel mixer drum and frame, machine-cut heat-treated al-



The new Smith-Mobile truck mixer.

loy steel gears, heat-treated ground steel shafts on roller bearings, welded annealed steel transmission case and drum support pedestal, oil-type disc clutches, two-compartment overflow-type water tank with calibrated gages and lubricated plug-type valves, two-piece swivel distributing chute, and choice of separate gas-engine drive or power take-off for truck-engine drive.

A new catalog No. 198, describing the line of Smith-Mobile units, is just off the press. Copies may be secured direct from the manufacturer by mentioning this item, or from CONTRACTORS AND ENGINEERS MONTHLY.

Now
4
Sizes
New



DIESEL TRACTORS by INTERNATIONAL HARVESTER

A YEAR AGO we announced the big, powerful TD-18 TracTracTor, a new top for Diesel crawlers. Today International Harvester presents a rugged quartet of streamlined crawlers—TD-18, TD-14, TD-9, and TD-6. **FOUR Diesel TracTracTors for 1940**—big news from the world's leading tractor builder to all operators of crawler tractors!

Here's the complete line-up for you to look over—the big fellow at the right, already a popular favorite in the heavy-crawler field; his little brother at the far left; and the step-ups in between. There's not an ounce of lazy horsepower in any of them! They're ready to tackle their weight in wildcats—each one is ready to lick the crawler-power problems in his range!

In this complete series of TracTracTors, INTERNATIONAL offers you a new standard of Diesel performance and economy—perfectly designed balanced power in capacities to meet every demand of crawler-tractor users. Standardize on International and enjoy all the advantages only Harvester can provide. Get the full story from any International industrial power dealer or Company branch, or write us.

A great variety of specially designed allied equipment available for all TracTracTor sizes.

INTERNATIONAL HARVESTER COMPANY
(Incorporated)

180 North Michigan Avenue

Chicago, Illinois



Portable Electric Tool Catalog Issued for 1940

The Black & Decker Mfg. Co., Towson, Md., has just issued its 1940 catalog on its complete line of portable electric tools, which includes a variety of electric drills, screw drivers and wrenches, nut runners, saws, hammers, bench grinders, sanders, and accessories.

Particular attention is called to two improved drills, the 1/4-inch Junior and the 1/2-inch Junior. Both of these drills are lighter in weight, have reduced over-all length and a number of new operat-

ing features.

Copies of the Black & Decker 1940 catalog may be secured by interested contractors and state and county equipment engineers direct from the manufacturer by mentioning this item.

Dragline Buckets

The features of Hayward dragline buckets in 1/4, 1/2, 3/4, 1, 1 1/2 and 2-yard sizes are described and illustrated in Bulletin 900, copies of which may be secured direct from The Hayward Co., 32-36 Dey St., New York City. These

buckets have one-piece bowl construction, reinforced with stiffener runners on the bottom to take wear from the bowl proper, and are equipped with heavy steam-shovel type teeth with manganese steel reversible and replaceable points. Another feature of these buckets is the adjustable bridles which makes it possible for them to dig at any angle.

New Paint Spray Outfit

The new small paint spray outfit recently announced by the Binks Mfg. Co., 3114-40 Carroll Ave., Chicago, Ill., is

designed for use on those hundred and one small painting jobs which arise in contractors' shops and state and county highway garages. The compressor of this compact unit delivers 2.2 cfm at 26 pounds working pressure to a new specially designed Roche J gun. This gun handles all kinds of average-viscosity paints, enamels, lacquers, etc. A piston-type compressor is also available.

Complete information on this single-diaphragm Roche paint spray outfit may be secured by interested contractors and state and county highway equipment engineers direct from the manufacturer.



A LIFE-SAVER FOR LIMITED HIGHWAY BUDGETS

● HAVEN'T YOU felt "all at sea" about this problem? How to get more improved roads and still stay within highway budgets? Many city, state and county highway officials have. They have also found what to do about it. Build the roads you need at the price you can pay with Standard Oil Asphalt.

Here are a few reasons why Asphalt is the solution. You can build fast, safe, all-weather streets or highways at a wide range of costs. You can choose the most economical type of construction to suit your present need. By adding to these improved surfaces each year or two, you soon build up a system of excellent streets or highways without resorting to excessive taxes, high bonded indebtedness and high interest payments.

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LOW COST
ASPHALT**



A Standard Asphalt representative, right in your territory, has further facts about Asphalt which you should know. Get in touch with him through your local Standard Oil (Indiana) Office or by writing 910 So. Michigan Avenue, Chicago, Illinois. Find out where Asphalt fits in your job of road improvement.

*Asphalt for
every purpose*

STANDARD OIL COMPANY
(INDIANA)

A New Relief Sewer For Boston Suburbs

Four Contractors Building 4.66 Miles of Trunk Sewer To Stop Pollution of Tidal Waters of Mystic River

THE North Metropolitan intercepting sewer which carries away the waste of approximately 20 cities and towns in north Metropolitan Boston was constructed in the 1890's. It has long since reached its capacity, and a new relief sewer is now under construction, calling for a total expenditure of over \$12,000,000. Under a PWA set-up, part of this sewer was constructed during the past few years at an expenditure of approximately \$3,500,000. The project now under construction, to cost about \$4,500,000, of which \$2,025,000 was secured as a PWA grant, will carry the sewage flow to Chelsea Creek in the vicinity of the East Boston Pumping Station.

The first project is about 8 miles long and takes all overflow to the tidal water, thus eliminating sewage pollution of the Aberjona River, the Mystic Lakes, and the Mystic River above the tidal water. The present program continues this sewer to Chelsea Creek where for the time being a larger volume of tidal water is obtainable for dilution. The comprehensive program calls for the eventual extension of this relief sewer to the harbor outfall off Deer Island Light.

The seven sections now under construction total 13,417 feet of open cut and 11,195 feet of tunnel and siphons varying in size from 8 feet 6 inches to 11 feet 3 inches and laid at depths from 22 to 90 feet below ground elevation, with tunnels used generally for all depths greater than 36 feet.

Section 106A

Section 106A was awarded to Edward M. Matz, Inc., of Jamaica Plain, Mass., on the low bid of \$318,157. The work consists of 4,710 feet of 8-foot 6-inch monolithic sewer in open trench with three 54-inch cast-iron siphons under the Mystic River. The section of the sewer is horseshoe. The work is north of the Felsway and parallel with the Mystic River except for the one crossing. The work is under the personal direction of Edward M. Matz, with Alexander "Sandy" Martinello as Superintendent and James M. McDonnell as General Foreman. James O'Rourke is Resident Engineer and M. E. Fitzgerald, Inspector, on Section 106A for the Sewerage Division, Metropolitan District Commission.

Section 105

The second section of the project, Section 105, runs from the Felsway in Medford to Main Street in Everett, Mass., parallel to the Revere Beach Parkway.

It was awarded to V. Barletta Co. for \$694,524 and consists of 6,000 feet of open cut and 500 feet of tunnel excavation. The sewer section, of horseshoe shape, is successively 8-foot 6-inch, 9-foot 3-inch, and 10-foot 6-inch, with a siphon under the Malden River. A portion of this work under the river is being done under air. The work for this contractor is under the personal direction of V. Barletta, with L. F. Davies, well-known compressed air worker, as Superintendent, and Joseph Whalen is Resident Engineer for the Commission on Section 105.

Section 104B

Section 104B was awarded in February 1939 to the C & R Construction Co. of Roslindale, Mass., for \$515,822.

The work consists of 2,292 feet of tunnel driven in two headings from a single shaft, the first shield for which was lowered into the shaft on July 6, 1939. The sewer in this section is 10 feet 6 inches and 11 feet 3 inches inside diameter. The work runs from Main Street, Everett, parallel to the Revere Beach Parkway to Spring Street, Everett. Francis Kelly is Superintendent for the contractor and George Gile is Resident Engineer for the Commission.

Section 104A

The next section south was awarded to Edward M. Matz, Inc., for \$184,978 and runs under the Revere Beach Parkway in open cut, thence through a public dump, and consisted of 2,067 feet of open cut and 70 feet of tunnel of 11-foot 3-inch monolithic section. Work was started on March 13, 1939, which happened to be a particularly bad blizzard, under a \$100 a day penalty clause, but the work was completed within the contract limit as described in a later, more detailed article. The contractor's super-

intendent was the same as on his other section and the Resident Engineer for the Commission was Robert Bowes.

Sections 102 and 103

Sections 102 and 103 were awarded on the basis of a combined bid for the two sections to be operated as one and went to the Silas Mason Co. of New York on the low bid of \$1,628,060. Work was started on March 12, 1939, with the driving of a single shaft from which two headings are being worked, one in gravel and the other in stiff clay, as the geological strata change diagonally across the shaft driven at the only convenient place in a triangle at the intersection of two streets, commonly referred to as a "square" in Boston parlance. The tunnel in these combined sections is 7,370 feet in length and the open cut only 640 feet. The sewer is 11 feet 3 inches in section and circular. The drainage of the gravel section with deep wells is one of the interesting features of this section, which will be described later in a separate article.

(Concluded on page 27)

PURCHASE ORDER
BATES & ROGERS CONSTRUCTION CORP.
CHICAGO - ILLINOIS
FROM THE MARION STEAM SHOVEL CO., MARION, OHIO, U.S.A.

SINCE 1923
COAST to COAST
SERVICE

From the Oakland Bay Bridge in San Francisco to The Pennsylvania Turnpike is the working itinerary of MARION shovels, draglines and tunnel shovels owned by Bates & Rogers Construction Corporation, Chicago, Ill. • This prominent contracting concern bought its first MARION in 1923. Four of the 13 MARIONS owned by this company were purchased in 1939. Two of them are MARION 3/4 cu. yd. shovels. The other two are 1-1/4 cu. yd. tunnel shovels especially designed for tunneling through rock on the Pennsylvania Turnpike. When a contractor like Bates & Rogers Construction Corporation reorders again and again — you know MARIONS have what it takes to clean up contracts in record time. There is a MARION for your material handling job — from 3/4 cu. yd.

THE MARION STEAM SHOVEL CO.
MARION, OHIO, U. S. A.

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SHOVELS • DRAGLINES • CLAMSHELLS
CRANES • PULL-SHOVELS • WALKERS

CONCRETE VIBRATORS

(Gas and Electric)

Concrete Surfacing Attachments



Master Vibrator Company, Dayton, Ohio
DISTRIBUTORS IN ALL PRINCIPAL CITIES



TAMPING ROLLER



ROTARY RIPPER



HEAVY DUTY RIPPER

New tamping roller and rippers recently announced by the Bucyrus-Erie line of tractor equipment.

New Tamping Rollers And Two New Rippers

Among the new tractor equipment exhibited at the A.R.B.A. Road Show were the tamping rollers and two new rippers recently announced by the Bucyrus-Erie Co., South Milwaukee, Wis.

The new B-E tamping rollers are offered in single, double or triple-drum models, with 72, 96 or 112 feet per drum available for each model. All rollers have rear pull connections for working in trains, and all drums are provided with openings for ballast. The double and triple-drum models have oscillating drums which permit the rollers to adapt themselves to uneven ground surfaces. The tamping feet are renewable; when they become worn they are easily removed and replaced with new feet.

The new rippers are of two types, a rotary and a heavy-duty cable-operated type. The feature of the rotary ripper is its rotating head which swings the ripping standards up and back and around to ripping position again. This feature is claimed to make this unit especially effective for work in material containing boulders and heavy roots. Complete rotation of the head also dislodges rocks and debris caught between the standards. Since power to rotate the head is derived solely from the pull of the tractor drawbar, the rotary ripper can be used with tractors having hydraulic controls or with tractors having no auxiliary power equipment.

The cable-operated ripper is a heavy-duty tool for breaking up exceptionally hard-digging hard-loading materials such as shale, hardpan, sandstone, old macadam and similar materials. Controlled by a cable operated from the tractor winch, the standards on Model CR-1 ripper can penetrate 17 inches below ground level and on the CR-2, 24 inches below ground level. The standards can also be set at any intermediate point or raised above ground for traveling. The self-sharpening ripping points are renewable and are easily replaced as they become worn.

The features of both the new Bucyrus-Erie tamping rollers and the two new rippers are described in bulletins which may be secured direct from the manufacturer on request.

Hydraulic Power Pump For Road Equipment

A new fan-belt-driven easily installed high-pressure hydraulic pump with one lever cab control for the fast operation of snow plows, truck maintainers and hydraulic road machinery, has been announced by Monarch Road Machinery Co., 327-329 Front Ave., N.W., Grand Rapids, Mich. This Hy-Rocket delivers pressures up to 1,000 pounds per square inch and gives quick action because acceleration of the truck engine governs the pump output. The pump unit re-

quires approximately 1/3 hp to operate.

The pump unit is the only working part and is protected under the hood away from the weather. It is self-lubricating, as it runs submerged in oil. The Hy-Rocket operates on both new and old equipment, is compact in size and is easy to install on any truck. It is a continuous-running fan-belt-powered gear pump circulating at zero pressure 98 per cent of the time, with the oil remaining at low temperature as it flows from the reservoir through hose lines to the pump, by-pass valve, and returns to the tank.

Diesel Engines Ready For 1940 Ford Models

The complete Hercules Power Package diesel replacement engines for the 1940 Ford conventional and cab-over-engine truck chassis are now in production, according to a recent announcement from the Hercules Motors Corp., Canton, Ohio. These new diesel packaged as-

semblies, built in accordance with the 1940 specifications, can be as readily installed as in previous models, as all required changes have been made and all necessary fittings are supplied with each unit. A new installation manual covering the sequence of procedure is also ready, for both the conventional and cab-over-engine models.

To market these units, a distributor organization has been developed to serve

the Ford dealers and truck operators, these distributors being located at points closely paralleling the location of the Ford Motor Co. branches.

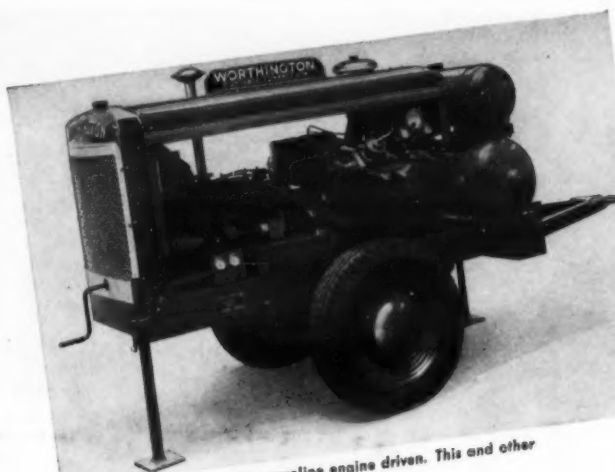
Complete information on these replacement units as well as copies of the new bulletin SP-158 covering the entire line of Hercules diesels which now includes 15 models, may be secured by those interested direct from Hercules by mentioning this magazine.

"CONTRACTION JOINTS IN ROADS"

They have behaved well—especially the ribbon type, which has now replaced most all others. They are neat, tight fitting and usually last as long as the road without maintenance.

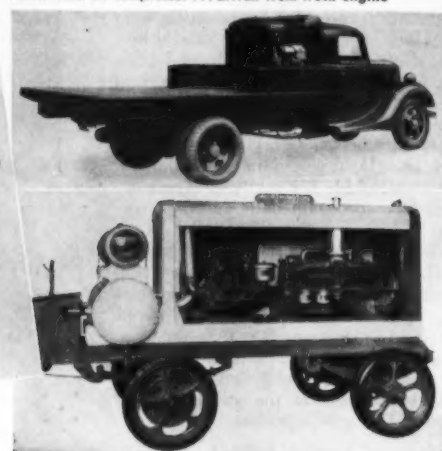
FLEXIBLE ROAD JOINT MACHINE CO.

Warren, Ohio



Two-wheel fast-towing trailer, gasoline engine driven. This and other units are available with Diesel engine drive

Power take-off compressor... driven from truck engine



Spring trailer with solid tires... gasoline engine driven

PNEUMATIC EQUIPMENT to fit the special needs of any construction job...

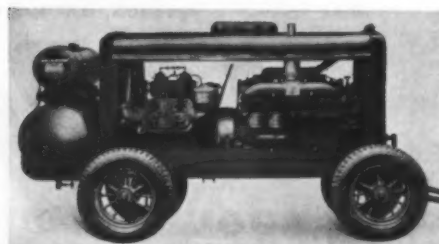


Rock Master Wagon Drill

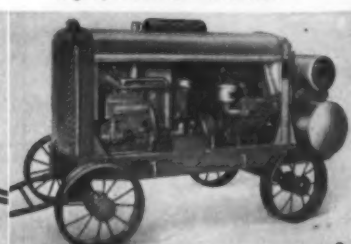
A complete line of portable compressors, rock drills, and air tools... built to operate economically and to stay on the job with a minimum of attention.



Rail car mounting... gasoline or Diesel engine, or electric motor driven



Diesel engine driven pneumatic tire towabout



Gasoline engine driven steel wheel towabout



WORTHINGTON PUMP AND MACHINERY CORPORATION

General Offices: HARRISON, NEW JERSEY • Offices and Representatives in Principal Cities

Special Equipment Aids Roadside Work

**Winner of National Award
Developed New Equipment
Which Improved Quality of
Work and Cut Cost**

(Photos on page 4)

THE outstanding contribution to roadside development made by Winston & Griffith of Dallas, Texas, winner of the National as well as the Southern Section Award in the 1939 CONTRACTORS AND ENGINEERS MONTHLY Roadside Development Awards, was the development of equipment and methods of mulch sodding which have resulted in a reduction in the cost of this work from approximately 80 cents per cubic yard about a year ago to an average of 55 cents, as well as greatly improving the quality of the work. In addition, the careful training of men in the use of this equipment has unquestionably contributed both to the reduction in cost and improvement of this type of work.

Description of Project

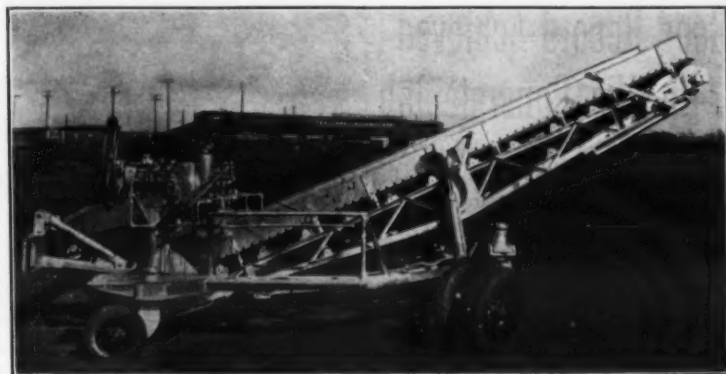
The project for which Winston & Griffith was nominated by the Texas State Highway Department was 5.472 miles in length, extending from Minerva, Texas, to the intersection with State Highway 36, and was constructed by the State Highway Department primarily to demonstrate the value of sodding in the control of erosion, but some minor grading and planting of trees and shrubs were included. The original highway, constructed in 1936, had not provided for erosion-control measures to protect the sterile barren slopes. The soil, being sand with a red clay subbase, soon eroded and destroyed the finished cross sections. To check this erosion and to stabilize the roadsides, Bermuda grass mulch sod was brought in and spread over the eroded areas to a depth of 3 inches. This mulch sod serves a dual purpose, first of supplying a fertile top soil, and second, of furnishing grass. After the material was spread on the designated areas, it was sprinkled at once, and as often thereafter as needed. The grass began to grow immediately and in less than four weeks the slopes were fairly well sodded.

One of the major erosion problems was to get the water from the roadside ditches to the bottom of the drainage channels on the downstream end of the culverts. The drainage channels were reshaped and sodded with block sod. This block sod was also used in roadway ditches where there was a high velocity due to steep grades, and in channel and culvert outlets.

In addition to the sodding, the intersection at the north end of the project

was improved, and planting carried out at strategic points over the entire length of the project. The central area of the triangle was lowered to give adequate sight distance across to Highway 36 on the north side of the intersection. The area was then covered with mulch sod. Large growing trees were planted in the central portion of the triangle while planting beds were prepared in the corners and planted with roses. Around each planting bed, guard posts were placed further to emphasize the intersection. The contractor used the excavation from the triangle to flatten the slopes of the fill section.

The general appearance of this project as completed is good. With the roadsides now stabilized, the amount of maintenance will be reduced to a minimum and



The elevating grader attachment for use with a crawler-type tractor developed by Winston & Griffith for loading sod.

the highway will be a pleasure to those who travel over it.

The Special Equipment

Any new work calls for different methods of construction which taxes the

ingenuity of the contractor. Winston & Griffith, contractor for this project, has met the requirements of this type of work by developing two machines which have reduced the cost of this type of

(Concluded on page 43)

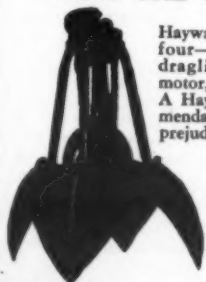
MAKE 1940 YOUR BEST YEAR with these Buckeye PROFIT BUILDERS

- 1 BUCKEYE CLIPPER—America's No. 1 Full Revolving Convertible Excavator—on which ALL operations are controlled by the "Mevac" Metered Vacuum Power Control System.
- 2 BUCKEYE MODEL 120 AND 160 DITCHERS—your answer to the sewer and water ditching problems.
- 3 BUCKEYE MODEL 410 TRENCHER—the smallest and most useful machine built for city utility trenching. "It gets in and out and under and around."
- 4 BUCKEYE WIDE TREAD TRAILBUILDERS AND BULLDOZERS—the most flexible machines in the field.
- 5 BUCKEYE SURFACE MATERIAL SPREADERS—OVER 600 IN USE.
THEY SPREAD ACCURATELY—sand to 1" stone—from a mere sprinkle to 60 lbs. per square yard—"just like unrolling a rug".
- 6 BUCKEYE TRACTOR POWER CONTROL UNITS—Medium Duty and Heavy Duty—Standard and wide Drum Models. Cable controlled "safe, sure, accurate and dependable".

SEND FOR COMPLETE INFORMATION AND PRICES ON THESE OUTSTANDING MACHINES.



USE RIGHT BUCKET FOR THE JOB



Hayward makes all four—clam shell, dragline, electric motor, orange peel. A Hayward recommendation is unprejudiced.



THE HAYWARD CO., 32-34 Day St., New York

Hayward Buckets

THE BUCKEYE TRACTION DITCHER CO., FINDLAY, OHIO

Please send full information and prices on the machines checked.

- | | |
|--|---|
| <input type="checkbox"/> CLIPPER—Shovel—Trench Hoe—Crane—Clamshell—Dragline—Pile Driver. | <input type="checkbox"/> Tractor Power Control Units. |
| <input type="checkbox"/> Buckeye Ditchers—Models 120 - 160 - 410. | <input type="checkbox"/> Rippers. |
| <input type="checkbox"/> Trailbuilders—Bulldozers. | <input type="checkbox"/> Equipment Trailers. |
| <input type="checkbox"/> Surface Material Spreaders. | |

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WAY**
ask for our
operation data
before you
bid

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CITY

STATE

EARTH HANDLING AND ROAD BUILDING EQUIPMENT FOR OVER 40 YEARS

Good Record Achieved On Wis. Concrete Job

(Continued from page 11)

trench. They were followed up by two men tamping under the base for a firm foundation, and a man with an insecticide tank spraying oil into the forms. Working between the forms on the grade was an Allis-Chalmers motor grader.

An R-B subgrader, running on the forms and pulling itself ahead by cables looped over the form pins, cut the grade to within $\frac{1}{4}$ -inch of the final grade. The machine was equipped with ramps so that there was no delay in getting the batch trucks back to the paver. Behind the subgrader a Freeman tilting turntable enabled the trucks to be turned by one man without leaving gaps in the forms to be placed later. The fine grade was rolled with a 3-ton Wehr roller. The turntable, owned by the batching contractor, was pulled by a cable with a sheave which made it easy for a truck to take hold and have sufficient power to move the table ahead.

Pouring the 20-Foot Slab

To prevent dust as well as to stabilize the sandy grade the dump man at the paver sprinkled the grade between handling the cleaning out of the bodies. The Koehring 27-E paver pulled a sturdy trail-grader and also, at a set distance, the heavy strike-off for the welded fabric reinforcing for the slab. This was pulled about 8 feet behind the trail-grader. One man on either side of the slab cleaned out the excess dirt in front of the blade and also cleared away the small spillage around the end of the blade against the forms.

Behind the paver were two puddlers in rubber boots, the vibrator operator who used an Electric Tamper & Equipment Co. unit to vibrate against the forms on both sides and also to vibrate around both the expansion-joint and contraction-joint steel. The gas-electric power for the vibrator was carried on the paver and a long rubber insulated cord attached so that the man could carry the vibrator back and forth across the fresh concrete in order to cover both sides.

The water for the paver was supplied at the Spring Green end by a C. H. & E. triplex pump taking water from a stock trough supplied by a city hydrant. At another point farther along the lines the contractor used three Griffin well-points, pumping direct from them with a C. H. & E. triplex pump. The third wellpoint was held in reserve as the two were sufficient to draw all the water there was from the ground in the vicinity. A $2\frac{1}{2}$ and a 2-inch pipe line was used, laid along the shoulder of the job. When it came time to move the paver hose fifteen men spaced themselves out along the hose and as soon as the connection was broken they trotted down the grade and remade the connection without losing a batch.

Slab Reinforcing and Joint Steel

This contract was partly relocation and partly over old road widened so the specifications called for the use of welded steel fabric reinforcement over



C. & E. M. Photo

The operator and helper on the Flex Plane were constantly busy cutting and finishing contraction joints and center joint.

the old road section where the settlement might not be uniform, and none on the new location. Where the fabric was omitted tie bars were used across the center joint. These $\frac{1}{2}$ -inch square bars 40 inches long were spaced uniformly 48 inches on centers. The tie bars were wired to long spacer bars 16 inches apart uniformly placed on either side of the center joint and composed of $\frac{1}{2}$ -inch deformed bars. Where the longitudinal spacer bars ended they were lapped 40 diameters or 20 inches and wired to make a continuous tie between the contraction joints. The steel fabric reinforcement is composed of No. 4 gage wire spaced 6 inches both ways. The mats were made up 13 feet long x 7 feet wide, were lapped 3 inches at the center and were laid 6 inches from the forms. At all joints they were lapped over the dowels to within 3 inches of the center of the expansion material or the contraction joint. The two steel men carried in the three mats for one section at a time after the concrete had been struck off 2 inches below the top of the forms. They placed the two outside mats first and then the third on top of them with the proper lap.

Expansion joints were spaced 100 feet apart and were set in a clear space in the concrete, made by placing boards across the point where the joint was to be laid, striking off the concrete and then shoveling the concrete off the boards and removing them. The pre-moulded expansion joint material is a special form $\frac{3}{4}$ -inch thick with fabric over the top edge to prevent extrusion of the impregnating material out of the

joint during hot weather. The dowels through the premoulded material, which was cut to the exact form of the grade and crown but $\frac{1}{2}$ -inch below the top of the slab, were $\frac{3}{4}$ -inch round rods 24

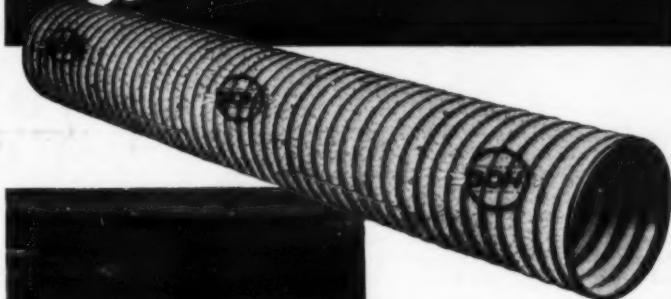
inches long painted and oiled and spaced 15 inches on centers across the joint. They were capped on one end to permit expansion without damage to the concrete.

The joint installer for the expansion joint, in accordance with Wisconsin specifications, must be of such strength that acting as a beam and spanning the full 20 feet between forms it will have a deflection of not more than $\frac{1}{8}$ inch. Alternate bars were clipped by the hooks of the installer while the other bars fitted into notched iron straps to space them properly. In addition, the dowels were held firmly, making a unit of the joint, by $\frac{1}{2}$ -inch deformed spacer bars running transversely and 8 inches from the center of the joint and also missing the center joint of the pavement by 3 inches. They were cross wired to the dowels.

The contraction joints were spaced 25 feet apart between the expansion joints and were reinforced by ladders composed of $\frac{3}{4}$ -inch x 24-inch round dowels

(Concluded on next page)

LOOK UNDER THE SPELTER COATING



to determine pipe quality

On the surface all corrugated pipe looks pretty much alike, but down under the spelter coating the real story of endurance is written . . . in the base metal itself. It is there that GOHI Pipe, by long odds, shows its unexcelled superiority because GOHI Pure Iron-Copper Alloy is the longest-lasting, low-cost ferrous metal, its stamina proved by more than thirty years of outstanding service in the ground. To use GOHI Pipe is to eliminate a major problem in highway construction—the permanence of the drainage structure.

New England Bolt Co. . . . Everett, Mass.
Central Culvert Co. . . . Ottumwa, Iowa
Capital City Culvert Co. . . . Madison, Wis.
Bancroft & Martin Rolling Mills Co. . . . S. Portland, Me.
Denver Steel & Iron Works Co. . . . Denver, Colo.
The Lane Pipe Corporation . . . Bath, N.Y.
Dixie Culvert Mfg. Co. . . . Little Rock, Ark.
St. Paul Corrugating Co. . . . St. Paul, Minn.
The Newport Culvert Co. . . . Newport, Ky.

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**POWER SHOVELS
DRAGLINES
CRANES
TRUCK SHOVELS, ETC.
 $\frac{1}{2}$ to 2 Cu. Yds.**

HERCULES ROAD ROLLERS

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NEWPORT, KY.**

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EXPANSION
JOINT

Standard in Concrete Construction for 25 Years
ECONOMICAL and EFFICIENT

Asphalt Joint • Rubber Joint
Non Extruding Expansion Joint
Plate Dowel Expansion Joint
Sub-grade Felt

THE PHILIP CAREY COMPANY
Dependable Products Since 1873
LOCKLAND, CINCINNATI, OHIO

Well-Planned Paving Project in Wisconsin

(Continued from preceding page)

spaced 15 inches on centers and painted and oiled. They were wired to transverse spacer bars of the same size as in the expansion joints.

Finishing

A Lakewood double-screed finishing-machine worked close to the paver and made four passes over each section. The operator shoveled the excess concrete away from the ends of the strike-off. Right behind the finishing machine a Flex Plane machine set the center-joint material and the contraction joints. The ribbon for the center joint was $\frac{1}{8}$ inch thick and $2\frac{1}{4}$ inches wide set $\frac{1}{4}$ inch below the top of the pavement and floated over by the helper on the machine. The contraction joints were cut by a toggle device at the front of the Flex Plane machine and the $2\frac{1}{4}$ -inch steel set $\frac{1}{4}$ inch below the top of the concrete and floated over. These steel plates are $\frac{1}{4}$ inch thick. At the rear of the joint-inserting machine a screed smoothed over the surface of the slab, leaving it in excellent condition for the next finishing step.

Between the Flex Plane and the Koehring longitudinal-finisher the joint man and his helper pulled a 9-inch stitched canvas belt over the surface. This was followed immediately by the mechanical bull-float with a 12-foot float working on an exact template to cut the final surface of the slab to correct parabolic crown. The float moved ahead $4\frac{1}{2}$ feet on every pass across the slab.

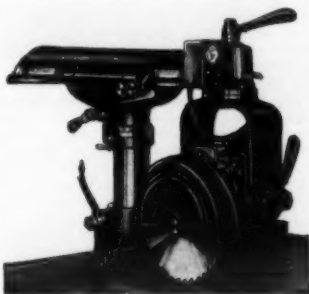
The first work of the hand finishers was to use a 10-foot Heltzel drag straight-edge and then hand float the sides and edge and use a 9-inch bow belt. The state inspector then checked the slab with a 10-foot Lakewood metal straight-edge. Then the same finishers used another 9-inch bow belt after they had built up any low spots noted by the inspector, or removed high spots of which there were very few, due to the cutting action of the longitudinal finisher. Two men then pulled the steel caps on the expansion joints and removed the steel from the contraction joints and edged all joints. They then belted the surface to give a uniform surface finish to the entire slab.

Curing

The curing was done with a covering of paper placed by two men. The Sisal-kraft reinforced waterproof paper was made up in 22-foot widths with the end 1 foot on each side folded up so that it could be placed 20 feet wide on the finished slab and then turned down to cover the edges when the forms were pulled. The paper was cut in 60-foot lengths rolled on 2 x 4's for ease of handling. When a roll of the paper was laid out, the edges were covered quickly with earth to prevent the wind lifting it from the pavement.

Personnel

This contract FAP 416-D & E was awarded to Jos. D. Bonness Inc., of Wauwatosa, Wis., on the low bid of \$239,820.10. The job was run in two 6-hour shifts a day from 6 a.m. to 6 p.m., without stopping at the change-over. The crews averaged 1,700 feet in 12 hours with a maximum of 1,770 feet on a day when 609 batches were handled. The job was run with a 60-second mix in the paver. Joseph D. Bonness was on the job a considerable part of the time but the work was in charge of Ray Davis, Superintendent. For the Wisconsin State Highway Commission, E. L. Roettiger, State Highway Engineer, and A. T. Bleck, Construction Engineer, R. M. Lovejoy was Resident Engineer.



The new Walker-Turner radial saw.

New Radial Saw Aids Field Carpenter Work

A new radial saw which has features designed to aid the contractor in cutting his carpenter costs on the job, and which may be equipped with a two-wheel trailer so that it can be moved readily from job to job, has been announced by Walker-Turner Co., Plainfield, N.J. Among the features of this

new radial saw is a geared-head motor, which is claimed to double the effective horsepower of the unit.

A voltmeter, supplied as regular equipment, indicates at all times whether or not sufficient line voltage is being supplied to the motor. Another protection for the motor is a magnetic circuit-breaker switch which permits the motor to work at full load capacity, yet cuts off the power on a sustained overload. The switch can be reset immediately without waiting for the elements to cool off. Another feature of the motor is a compensating gear which eliminates the possibility of stripping the teeth and yet which requires no resetting.

This new Walker-Turner radial saw cuts miters and compound miters, both in ripping and cross-cut positions. It cuts, grooves, rabbets and tenons. With the proper tools which are available, it routs and shapes. The sliding ram runs in dust-sealed ball-bearings which are mounted on eccentric pins, making it possible to take up wear. A laminated maple table is used as a working sur-

face. All of the controls for raising, lowering and swinging the motor assembly and ram are positive in action and conveniently located. New illustrated bulletins, giving all details and costs, are available.

Booklet on Tar

A 26-page booklet providing contractors and state and county highway engineers with a description of the various types of Neville tars and the essential information on the construction and maintenance of each type of tar road is issued by the Neville Co., Neville Island Post Office, Pittsburgh, Penna. The types of road tar include cold-application tar, hot-seal-coat tar, binder tar, hot and cold-patch tar, crack and brick filler tar, and tar for bituminous concrete. Waterproofing and wood preservative tars are also described.

Copies of this booklet may be secured direct from the Neville Co. by mentioning this item, or from CONTRACTORS AND ENGINEERS MONTHLY.



OF ANY OTHER SCRAPER?

This contractor proved to himself conclusively that this LeTourneau "RU" Carryall Scraper had an extra earning capacity to the tune of \$58,000 over the nearest competitor! Actual comparative demonstrations on a section of the Pittsburgh, Pa., Housing Project bear this out:

Though a "like-capacity" scraper made trip for trip with the LeTourneau "RU" . . . fullest capacity loads in both scrapers, weighed on the job, showed the "RU" Carryall delivering 22.12 pay yards (79,400 lbs. net dirt weight) as against the competitor's 16.94 yards (60,800 lbs. net dirt weight) . . . or 5.18 more pay yards of clay-like shale han-

dled the LeTourneau way for the same D8 tractor horsepower!

For one thing, this indicates the loading ease of LeTourneau Carryalls. Then, consider the added life of LeTourneau double bottoms to lengthen equipment life . . . plenty of tires engineered to the equipment, so they're rarely overloaded . . . positive ejection that gives controlled spread of all materials—winter or summer.

But, back to the demonstration . . . with both machines averaging 2300-foot cycles in 10.5 minutes . . . or 41 loads each seven-hour shift . . . the LeTourneau Carryall moves 29 more yards per hour . . . 205 more pay yards each seven-hour shift . . . with extra LeTourneau profit figuring out like this: In 10,000 hours—accepted construction equipment life—the LeTourneau Carryall would account for 290,000 more yards . . . or figured at 20c a yard, would earn \$58,000 over the nearest competitor.

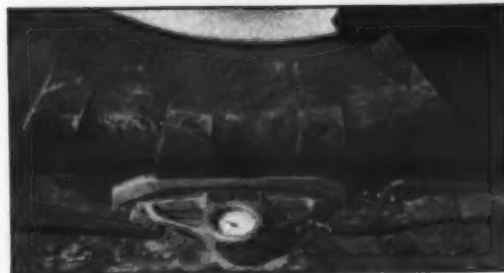
Thus, we ask . . . could you afford the gift of any other scraper? Ask your LeTourneau and "Caterpillar" dealer, or write R. G. LeTOURNEAU, INC., Peoria, Ill., Stockton, Calif.

LETOURNEAU

CARRYALL* SCRAPERS

ANGLEDZERS* BULLDOZERS, ROOTERS*, POWER CONTROL UNITS, DRAG SCRAPERS, PUSHDOZERS, SHEEP'S FOOT ROLLERS, CRANES, TREEDZERS.

*Name Reg. U.S. Pat. Off.



... DEMAND A DEMONSTRATION

Avoid Legal Pitfalls

These brief abstracts of court decisions may aid you. Local ordinances or state laws may alter conditions in your community. If in doubt consult your own attorney.

Edited by A. L. H. STREET, Attorney-at-Law.

Legal Effect of Mistakes in Bids

A good word was spoken for bidders on construction jobs about two centuries ago when Alexander Pope remarked that "to err is human; to forgive, divine." But the law reports indicate that there has been an oversupply of errors in computing bids for jobs and a dearth of divine instinct on the part of those in whose favor the errors were made. So, we rise to suggest that it is better to exercise the utmost care in checking and rechecking the figures on which a bid is to be based than to count on the owner's being disposed to forego taking advantage of any mistake that may be made when submitting the bid.

Sometimes a mistake of this kind does not involve more than the expense of a lawsuit in which a court is induced to decide that the mistake was excusable and that therefore the bid could be withdrawn, together with any bond or deposit put up with the bid. In other cases, bidders have found themselves bound by their mistakes under the general rule that a two-sided contract cannot be set aside by a one-sided mistake. In still other cases, they have secured their bids, but not their deposits made with the bid, back.

Below we summarize decisions that have been reached in typical cases and show the various grounds on which bids have been released.

Nearsighted Engineer Errs

If an engineer employed by a contracting company had had a good pair of eyeglasses, the case of Moffett, Hodgkins & Clark Co. v. City of Rochester, 178 U. S. 373, might never have arisen. But he was nearsighted and wrote down \$1.50 per yard as the price for tunnel excavation to be embodied in a bid on a water-works conduit job, when he intended to write \$15 per yard. Litigation over the company's right to withdraw the bid started in a federal court and was carried to the highest court of the land, via the United States Circuit Court of Appeals. The Circuit Court of Appeals decided that this mistake "was not a mistake in any legal sense, but was a negligent omission, arising from an inadequate calculation of the cost of the work. Courts cannot permit such omissions to be brought forward by those who make them as a ground for receding from their engagements. The party in fault must have exercised at least the degree of diligence which may be fairly expected from a reasonable person." (91 Fed. 28.)

Happily for the bidder, the United States Supreme Court adopted a different view of the case. That court held that the contractor was not bound by the bid because: (1) the mistake was an honest one; (2) the bidder had given prompt notice to the city on discovering the mistake, and (3) the city had taken no action to its prejudice on the bid. The court approved what the trial judge had said: "If the defendants—the city authorities—are correct in their contention, there is absolutely no redress for a bidder for public work, no matter how aggravated or palpable his blunder. The moment his proposal is opened by the executive board he is held in a grasp of steel. There is no remedy or escape. If, through an error of his clerk, he has agreed to do work worth \$1,000,000 for \$10 he must be held to the strict letter of his contract, while equity stands by with folded hands and sees him driven into bankruptcy."

Under similar reasoning a New Jersey court permitted a bidder to withdraw a bid and take down a check filed with it, where his bookkeeper had overlooked an important carpentry item in casting up the figures on which the bid was based. (Barlow v. Jones, 87 Atl. 649.)

An Illinois Case

During the forenoon of the day on which a municipal improvement job was to be let, the plaintiffs formed a partnership to bid on the work. In the necessary haste, a mistake was

made in setting down in a column covering the price per foot to be bid on pipe figures representing the weight of the pipe per foot. This made the bid more than \$6,000 less than the sum the plaintiffs intended to bid. When the bids were opened, a member of the board mentioned to the board the fact that apparently a mistake had been made, but the bid was nevertheless accepted, it being the lowest submitted by more than \$3,000. Discovering their mistake, the "successful" bidders notified the board about five hours after the bid had been accepted. The city refused to release the plaintiffs and a suit followed. The Illinois Supreme Court decided that the plaintiffs were entitled to a return of their bid and certified check, because: (1) the board was apprised that a mistake had probably been made, before it accepted the bid, and (2) it did not appear that the board could not have accepted one of the other bids after notice of the mistake was received. The court, like the United States Supreme Court in the Rochester case cited above, rejected a contention on the part of the city that the unduly low bid on one item might have been deliberately made with a view to making up the loss by high bids on other items. (R. O. Bromagin & Co. v. City of Bloomington, 84 N. E. 700.)

Haste Made Waste

Another case where expensive litigation was caused by a mistake in preparing a bid, but where the bidder was released, arose through the bidder having turned two pages of his estimate book, instead of one, in preparing his bid. The mistake occurred in the haste required to prepare the proposal after data had been secured from subbidders. The Indiana Appellate Court released him because: (1) he acted in good faith; (2) the bid as an offer to contract—not a contract—was withdrawable before its acceptance, and (3) before it was accepted he had notified the city of the mistake and of his unwillingness to contract on the basis of the erroneous proposal. (Board of School Commissioners v. Bender, 72 N. E. 154.)

Another Way Out

In a Minnesota case the plaintiff had bid on a sewer and water works job, and the bid had been accepted. Before a formal contract was signed, he discovered that, through a mistake, he had based his bid on earth excavation only, although there was much rock to be removed. The city permitted him to amend his bid, but no formal contract could be agreed upon. The city refused to return his deposit, but the Minnesota Supreme Court ordered its return, saying: "Had the city stood on its right to hold the plaintiff to this contract, the plaintiff would have had no cause for action, but the city did not do so. It was competent for the parties to abandon the contract made by the bid and the acceptance of it by mutual consent. This is what they did do." (Tunny v. City of Hastings, 141 N. W. 168.)

Overlooked Manholes

Village authorities refused to permit a sewer contractor to withdraw his bid, before it had been opened, although he demanded its return on the ground of a mistake, just discovered, in overlooking the cost of manholes. The bid was declared accepted. The trial court in which he sued for return of his deposit ruled that the plaintiff was out of luck. But the Wisconsin Supreme Court was more sympathetic and ordered return of the deposit, saying: "We are of the opinion that, when a bidder who has made a mistake in his computation, or mistakenly omitted items from consideration in making his estimates, in good faith, asks to withdraw his bid for correction before the bids are opened, he is entitled to withdraw it; and that if, in such case, the municipality refuses to allow him to withdraw it, he is entitled to re-

cover his deposit. It may be that such a rule will allow dishonest bidders to claim mistake when there is none in fact. And it will require readvertisement where there is only one bid, if the bidder does not file a corrected bid. But the city is in no worse position than it would be, had no bid been filed at all, and here there were other bids, so readvertisement would not have been necessary." (Gavahan v. Shorewood, 228 N. W. 497.)

There are several court decisions in cases where retention of bidding deposits has been upheld despite mistakes in preparing bids, such as where readvertisement involved considerable expense, where there was an agreement for forfeiture of the deposit in case of withdrawal of the bid, where the job was relet at considerable increase in cost, where the mistake resulted from carelessness, etc.

New Water Heaters For Winter Concrete

Two new water heaters which are designed to provide large quantities of hot water in freezing weather have recently been announced by the Hauck Mfg. Co., 116-126 Tenth St., Brooklyn, N. Y. The new oil-burning heaters Models No. 308 and 309 are featured by an inverted conical double heating coil, water-jacketed shell which preheats and insulates, and tangential firing with torch flame burner. The manufacturer states that this improved design and added heating surface heats the water more quickly with less fuel.

The large No. 309 heater will provide a maximum of 1,660 gallons of water an hour with a 50-degree F. temperature rise and a minimum of 600 gallons of heated water an hour with a 140-degree F. temperature rise. The smaller No. 308 produces 1,250 gallons an hour with a 50-degree F. temperature rise or 450 gallons with a 140-degree F. temperature rise. The manufacturer states that it takes only 5 minutes to put the heater

in operation and that the water is hot 2 minutes after starting.

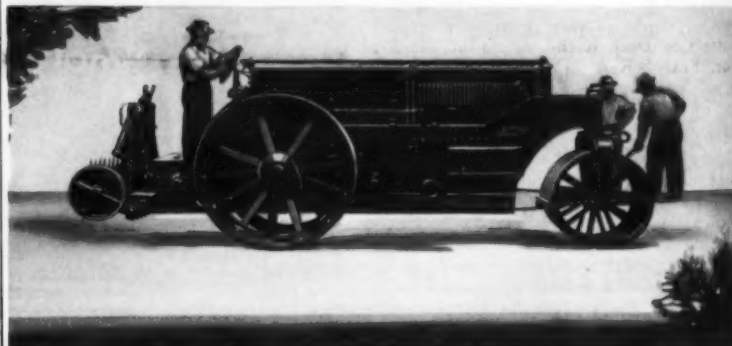
The inverted conical double heating coil construction exposes a maximum amount of coil heating surface to the burner heat and eliminates the necessity for baffles or heat deflectors. The water jacketed shell consists of a double wall metal reservoir, surrounding the heating coils. The water enters the reservoir, forming a water jacket, at the same time assuring long life to the reservoir. In this jacket, the water is preheated or warmed before entering the heating coils. The jacket acts as an insulator and keeps all the heat inside the heater.

Complete details on these two new Hauck water heaters are found in Bulletin No. 503, copies of which may be secured by interested contractors and engineers direct from the manufacturer.

Diesel-Driven, Two-Stage High Capacity Compressors

Chicago Pneumatic Tool Co., 6 East 44th St., New York City, has recently issued Bulletin No. 767, describing its new CP diesel-driven two-stage air compressors for stationary service. These Class W-CO units consist of a double-acting water-cooled compressor on a common crankshaft and base with a Chicago Pneumatic heavy-duty diesel engine. Standard sizes are available in capacities from 662 to 2,000-cubic feet per minute for pressures of 80 to 125 lbs. The bulletin gives full details regarding the economies of compressor operation with diesel power, as compared with electric drive.

Copies of this well-illustrated bulletin will be furnished free to those writing direct to Chicago Pneumatic Tool Co.



BUFFALO-SPRINGFIELD

3-AXLE TANDEM — 3-WHEEL AND TANDEM ROLLERS

12 MODELS — 2 to 21 TONS — GASOLINE OR DIESEL POWERED
TRENCH ROLLERS — PORTABLE ROLLERS
THE BUFFALO-SPRINGFIELD ROLLER CO.

SPRINGFIELD, OHIO



Distinctive DIGGING FACTORS

Tremendous OWEN closing power, converted to digging power assures "A Mouthful at Every Bite." Since the majority of sheave block weight is in the bottom sheave, it directly counteracts the lifting force of the lines and transforms it to balanced, extra digging power.



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Change of Address

(Mail to Contractors and Engineers Monthly, 470 4th Ave., New York, today)

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By using USS Man-Ten high-tensile steel in the construction of its snow plow and wing, the Moto Wing Co. saved 1,000 pounds in dead weight without sacrificing strength in its new rotary plow. The unit is shown mounted on a Walter Snow Fighter belonging to the Minnesota Department of Highways.

Metropolitan District Builds New Trunk Sewer

(Continued from page 21)

rate article on this work. R. L. Telford, who was in charge of the driving of the East Boston Tunnel, now known as the Summer Tunnel, is Superintendent in charge for Silas Mason, and Edward Sulesky is Resident Engineer for the Commission.

Section 101

This section is only 963 feet in length and is all in tunnel, consisting of a siphon of three precast 60-inch concrete pipes laid in a 14.5-foot tunnel. Work on this section had not progressed far at this writing but will be described in detail later in the series of articles on these sewer sections. The siphon under Chelsea Creek will connect the new trunk sewer with the East Boston Pumping Station which delivers the sewage to an outfall at Deer Island in Boston Harbor. Francis Kelly is Superintendent for the C & R Construction Co. which was awarded this section on its bid of \$608,538. Work was started April 24, 1939. Walter Corsano is Resident Engineer for the Commission.

Administration

The new trunk sewer will be completed within about 18 months from the start of the work or early in the spring of 1940. The entire project is being built under the direction of Joseph P. Dever, Chief Engineer, Sewerage Divi-

sion, Metropolitan District Commission, Boston, Mass., with Thomas A. Berrigan as Deputy Chief Engineer. Eugene C. Hultman is Chairman of the Metropolitan District Commission.

Device Aids Cutting Of Pipe and Plates

A new marking device which makes it possible to lay out quickly accurate cut lines on any size of pipe, or any rectangular shape, for torch cutting, sawing or shearing, without the use of templates, wrap-arounds or engineering computation, has been introduced recently by Advance Sales Co., 1003 E. Slauson Ave., Los Angeles, Calif. This Trumark protractor has been used both in shop and field work on welded pipe for installation by the Los Angeles Department of Water and Power.

It is reported that the protractor can be used by anyone in the field or shop without previous experience or layout training to obtain accurate cut marks.

It is placed on the pipe or any rectangular shape and is held in level position by a strong spring chain. The level is determined by a bubble indicator. Any desired angle for the cut is set on the 180-degree scale. The marking is done by a special chalk that will not blow off and is easy to follow. The protractor is rigid in marking position and gives a true line. It is made of cast bronze alloy in four models to handle pipe up to 3, 6, 12 and 14 inches respectively.

New Road Sweeper

A new axle-driven road sweeper which will sweep either to the right or to the left, the change being made by one man in a few seconds, has just been announced by the W. E. Grace Mfg. Co., 1819 Chestnut St., Dallas, Texas. This sweeper, which was on display at the Road Show in Chicago, is designed for bituminous road work.

The overall width of the brush is 8 feet, with the actual fibre width 7 feet 2 inches and a diameter of 33 inches.



The new Grace road sweeper.

Hickory, bamboo or wire brushes are available. With the brush at right angles, the overall width of the machine is under 8 feet, keeping the unit within the legal width limits for transportation from job to job. Three sweeping speeds are provided by a transmission with gears running in oil. All bearings are of the anti-friction type, with dust seals. Both rear wheels drive, providing ample traction, even though the machine is comparatively light in weight. The sweeper has three wheels, all tires being 6.00-16.

Complete information on this Grace road sweeper may be secured by interested contractors and state and county highway officials from the company.

485 MILLION YARDS OF DIRT

A 5½-year digging story, with a cast featuring 12,500 clutches and a "moral" that points to profit for you.

In 1934 Bucyrus-Erie introduced the 3½-yard 10-B, and revolutionized the small-machine excavating field. One of the features behind the outstanding performance of this machine was control; and behind this was a NEW TYPE of clutch. Big, with few parts to wear or complicate the speed of their response, these clutches gave the operator a more direct, smooth control of the machine's every function than any other clutch developed before or since. Easy to maintain, and giving full operating efficiency throughout their long life, the 10-B type clutches were a success from the start.

A total of over 12,500 clutches of this type have now seen service on Bucyrus-Erie — on machines that have moved over 485 million yards of material in the 5½ years since 1934.

You'll find one of the main reasons the new 2½-yard 54-B will give you more output than any other machine in its size range is that the same type clutch has been tailored to give the operator full control of the power and speed so thoroughly built into this new Bucyrus-Erie.

Write for full details on this proven, proven gallery of our performance.



Bucyrus-Erie

SOUTH MILWAUKEE, WISCONSIN

BEFORE YOU BUY IN
"40" SEE THE REX
TILTER



Here's the husky little brute that starts cutting costs even before it reaches the job. You'll find the Rex 3½S trows faster—spots faster—charges faster—discharges faster—than any other mixer in its class. And that all adds up to more profit per yard.

FREE—If it's profit you're interested in, you'll send for free Rex 3½S catalog before you buy a small mixer. Get your copy today. Address: Chain Belt Company, Dept. M-2, 1666 West Bruce St., Milwaukee, Wis.

REX
MIXERS



C. & E. M. Photo
The Jones Superior Woodworker which
cut the lumber for forms.

Wellpoints Aid Work At Sewage Plant Job

(Continued from page 2)

uring 20 x 62 feet 6 inches each underdrained to a sump, the effluent being pumped to the sewage effluent going to the intermittent sand filter beds. The design of the plant makes it possible to remove the Imhoff sludge by gravity and complete flushing facilities are installed in each tank, using 2-inch galvanized-iron water lines and city water at 100-pounds pressure.

An interesting feature of this plant is the ten relief valves in the bottom of the tanks to take care of ground water. If the pressure of ground water is greater than that of the sewage within the tanks, particularly during filling or at any time during cleaning, these relief valves will admit ground water to the tanks. On the other hand, the 11-inch round plates which are free to move laterally and upward against four lugs seat tight on a lead gasket when the pressure of the sewage is greater than that of the ground water, thus preventing leakage of the sewage from the tank. The elevation of ground water varies from 45 to 52, while the elevation of the bottom of the tank is 41.83.

Handling Water During Construction

The Imhoff tanks run north and south, while the long dimension of the group is east and west. The Aberthaw Co. started excavation aiming to take care of the ground water near the surface with a sump at the northeast corner of the excavation. A 6-inch Rex self-priming centrifugal was installed and handled all water which entered the sump at or near the surface of the ground. This method had to be abandoned when the footings for the main walls were completed, because they cut off the flow of water at the surface. Eighty Moretrench wellpoints were driven to 2 feet below the lowest excavation to take care of the ground water, and later fifty more were added, some at a higher elevation and others at the same elevation. The difficulty in dewatering this section was caused by a streak of clay and stone floor about 8 inches thick located about 3 feet below the wall footings, which

prevented the water from reaching the lower wellpoints. Those points which were driven above this strata were constantly sucking dry and had to be shut off.

The 1½ and 2-inch Moore wellpoints were driven 3 feet apart and were connected through an 8-inch header to a Moretrench wellpoint pump, the discharge of which ran about half full during the major part of the construction when fifty-five wellpoints were shut off and seventy-five were working. Because the major portion of the water seemed to enter the site of the excavation at the southwest corner, the contractor dug a sump there and put in five additional wellpoints with mops, which were regulated to take care of the fluctuations of the ground water. A second sump near the northwest corner of the tanks on the west side was dug 1 foot 3 inches below the lowest excavation while the other was 18 inches below the lowest excavation. They were not excavated lower because quicksand was encountered. This combination of wellpoints made it possible to perform all excavation under reasonably dry conditions.

Excavation and Construction

The general excavation within the 90 x 140-foot area for the Imhoff tanks was done with a ½-yard Bay City shovel and was carried down to the bottom of the footing, or about 4 feet below ground water level. The footings are 4 feet and 4 feet 9 inches wide under all of the main walls and then below them the hopper bottoms were excavated after all of the walls had been completed. This excavation ran more than 6 feet below the footings. The outer walls were 20

inches wide at the base and 16 inches at the top, while the interior walls are 18 inches wide at the base and 13 inches at the top and the exterior cross walls vary from 16 to 13 inches.

The procedure in pouring was first to pour the footings for the walls, and then the walls. The west outer wall was poured first, then the intermediate wall, and then the separate east wall of the first set of tanks with the end walls. Pouring was then started at the east end and continued back toward the completed work.

The excavation for the hopper bot-

toms was handled with a rented Lima crane having a 70-foot boom and using 1-yard skips which were hand-loaded. After this the 8-inch slab of the hopper bottoms was poured.

Forms

All of the form lumber was cut on the job, using a Jones Superior Super Wood Worker. The wall forms were made up of ¾ x 8-inch tongue and groove stock known as North Carolina roofers. Studs were 3 x 4's and the rangers 2 x 8's of short leaf yellow pine.

(Concluded on next page)

It's all Mixer

the kind that mixes concrete scientifically,
producing a higher quality concrete.

Ransome.

produces one of the most complete lines
of concrete mixers made.

Write for latest Bulletin

RANSOME CONCRETE MACHINERY COMPANY
DUNELLEN, NEW JERSEY

LA CROSSE Heavy Duty TRAILERS



The most complete line on the market. Capacities, five to two hundred tons. Four to sixteen wheels. Two to eight axles. They are built to take the heaviest loads safely, and with the least damage to road beds. Write today. Just tell us what you have to move.

LA CROSSE TRAILER & EQUIPMENT CO., LA CROSSE, WIS., U. S. A.

DIVISION OF LA CROSSE BOILER CO.

**THE LARGEST TRAILER
IN THE WORLD IS A
LA CROSSE!**

**Dirt Moving Pays
BIGGER PROFITS
When You Use
HEIL DIG-N-CARRY
SCOOPS!**



Efficient Heil Dig-N-Carry Tractor Scoops go out and boil in real payloads for you — and bring 'em back lively, to help you push even tough jobs through on schedule — and make money. The guaranteed hydraulic system provides safe, speedy finger-tip control of every

operation and insures accurate cutting and spreading. There are many other Heil advantages that help dirt-moving contractors everywhere enjoy real savings in time and service expense . . . Complete facts are yours for the asking . . . Write, wire or phone today.



SAND'S-STEVEN'S Line & Surface LEVEL



Endorsed and Adopted by Road
Builders and Contractors

Level is easily and quickly attached to line. Special feature construction prevents accidental detachment from line. Construction is sturdy, and accuracy guaranteed.

SAND'S LEVEL & TOOL CO.
8821 Gratiot Ave. Detroit, Mich.

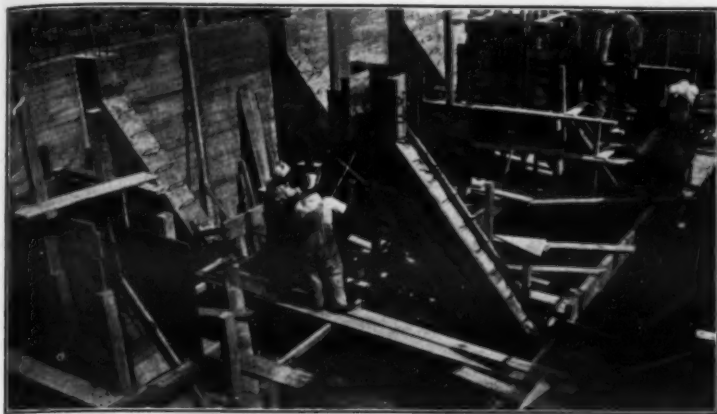
See new Heil Road Machinery on exhibit
at Road Show; New Heil Motor-Scoop;
New Heil Cable Scoop; New Heil Trail-
builder; New Heil Semi-Trailer Truck Scoop.

HEIL
Quality
Equipment

THE HEIL CO.

MILWAUKEE, WISCONSIN

HILLSIDE, NEW JERSEY



C. & E. M. Photo
The interior of the Imhoff tank, showing the forms for the brackets which support the interior baffles.

Pouring Concrete for Meriden Sewage Plant

(Continued from preceding page)

The panels, all of which were oiled and measured 3 x 6 feet for the inside of the walls and 3 x 12 feet for the outside, were all handled by hand. The studs were spaced 18 inches center to center and the rangers 3 feet 6 inches center to center. In assembling the panels for the walls, wood spreaders and wire bolts were first used, but because of the batter of the wall and the amount of steel reinforcing the Superintendent changed to the use of Universal Twisties. Above grade 5/8-inch oiled plywood was used for the forms, with the rangers and studs of the same size and spacing as described above.

Mixing Plant and Concreting

A simple and effective concreting plant was set up at the center of the west end of the Imhoff tank site outside the walls. It consisted of a structural steel tower 42 feet above ground level and 8 feet below ground elevation. Within this a 1-yard concrete bucket was operated by a Lidgerwood 2-drum hoist driven by a Waukesha motor, the second drum being used to raise the skip of the Ransome 21-S mixer powered with a Continental motor mounted at ground elevation and delivering direct to the tower bucket.

All aggregate was stockpiled on wood-

en platforms adjacent to the mixer and charged by scoop wheelbarrows with rubber tires, three for sand and five for stone, with struck measure. Following

the 1 1/2-minute mix, which made it possible to deliver a batch every 2 minutes, the concrete was buggied on trestles with five Jackson iron-tired concrete carts with a sixth for a spare. The concrete was shot in first at one-half height in the forms for the walls and then at the top, all of the walls being poured monolithic. The continuous pours comprised two of 140 yards and one of 120 yards for each pair of tanks. Each of these required a full day's production extending through about 7 hours.

Personnel

Work on the construction of the new Imhoff tanks at South Meriden, Conn., PWA Project Connecticut 1370-F, was started April 10, 1939, with excavation beginning the following day. The work was completed October 6, 1939. The new plant and changes in the old plant were built from the designs of Metcalf & Eddy, Consulting Engineers, Boston, Mass., for whom Fred W. Carlson was Resident Engineer during construction. For the Aberthaw Co. of Boston, Mass.,

contractor for the tanks, L. F. Silver-smith was Superintendent. The entire job was executed under the supervision of C. P. Prann, City Engineer.

The Annual Roadside Development Awards for highway contractors will be presented again this year by CONTRACTORS AND ENGINEERS MONTHLY. Interested state highway engineers and contractors should write for full details.

TARPAULINS ROAD MATS WINDBREAKS

CONTRACTORS' SUPPLY DEALERS in every state sell the Fulton line. Specify SHURE-DRY and FULTEX Tents, Tarpaulins, and Windbreaks—anything made of canvas. Also Fulton Road Mats and Surfaces. Fulton products are good and their prices are right.

Write for prices

Fulton Bag & Cotton Mills

Manufacturers Since 1872

ATLANTA, N. Y., CHICAGO, INDIANAPOLIS, MINNEAPOLIS, NEW YORK, NEW ORLEANS, ST. LOUIS, ST. PAUL, KANSAS CITY, MO.

MORE GARDNER-DENVER DRIFTERS AT WORK ON DELAWARE AQUEDUCT THAN ANY OTHER MAKE OF DRIFTING DRILL!



GARDNER-DENVER AF-99 Automatic Feed Drifters Drive 29.8% of Big Tunnel!

The Job—DELAWARE AQUEDUCT—NEW YORK CITY WATER SUPPLY

Total Length of Tunnel.....85.42 miles
Mileage Being Driven by Gardner-Denver AF-99 Automatic Feed Drifting Drills.....25.50 miles
Percentage Being Driven by Gardner-Denver AF-99 Automatic Feed Drifting Drills.....29.8%
Total Number of Headings.....47
Number of Headings Equipped with Gardner-Denver AF-99 Drifters...15
Percentage of Headings Equipped with Gardner-Denver AF-99 Drifters.....32%

34% of all drifting drills on the entire tunnel are Gardner-Denver AF-99 Automatic Feed Drifters.
In addition, 81% of all the new drill steel sharpeners purchased for the Delaware Aqueduct are Gardner-Denver. Gardner-Denver also furnished 21 new DE-1 oil forges and sixteen 10 x 3 x 10 grout pumps.



Gardner-Denver DS-6 Sharpener

You may call it chance—or just plain salesmanship—when one manufacturer furnishes the biggest percentage of drills for one particular tunnel job. But when that manufacturer furnishes drills for every important tunnel job of recent years, you can be sure that that manufacturer's drills can prove it with performance! Gardner-Denver Drills not only are doing the biggest share of drilling on the Delaware Aqueduct, but they have established their superiority on such big projects as the Stanislaus Tunnel . . . Shasta Dam Diversion Tunnel . . . Grand Coulee Penstock Tunnel . . . Loch Raven Montebello Aqueduct. Write us to learn what Gardner-Denver Automatic Feed Drifters have done on these jobs—and what they can do on yours. Our nearest branch office will supply complete information! Gardner-Denver Company, Quincy, Ill.

GOOD-BY WASHBOARD ROADS



Twenty to forty miles of rough "pitted" road can be put in first class condition each working day of 8 hours with a BURCH Under-Truk-Maintainer, at a cost of the gas and oil plus the truck operator. It is the ideal machine for honing blacktop or stabilized roads.

Can be attached to any truck in a few minutes and is hydraulic operated from the truck cab, or from the rear of the machine.

Write for catalog.

Manufactured by

THE BURCH CORPORATION
Crestline, Ohio

GARDNER-DENVER
SINCE 1859



All internal trusses were arc-welded in jigs for uniformity.

Welding Cuts Costs Of Novel Bridge Job

(Continued from page 15)

plates adjusted. The location of frames was marked and all carefully leveled up. Meanwhile, complete unit frames were welded together in a jig. This complete frame consisted of the deck and bottom longitudinal angles, the bulkhead stiffener angle, and all the cross struts from one bulkhead to the other. This jig was made on a flat steel plate with stops and clips so that the frames fitted together just by laying the angles in their proper places. The ends of the angles were clamped together and welded. The complete frame was then removed, turned over, and stacked flat. A welder then finished welding the connections on that side. A template of the lap of the bulkhead plates was used as a guide on the bulkhead stiffener for the burner's torch. This completed the building of the frame. After a few frames were finished, a check was made of the time taken to build one frame. An average of 20 minutes was required for each.

One of these unit frames was then erected on top of the bottom plates. This was carefully lined up and cross-braced. From this as a guide, a second frame set up next to it was spaced at the top with a slotted bar slipped down over the legs of the two angles, this procedure being followed for the rest of the frames in the first compartment.

With this set of frames up, the transverse bulkhead plates were erected against the frames. As soon as the transverse bulkhead was erected, the frames for the next compartment were erected in a similar manner.

The vertical side frames were welded to the side plates in a horizontal position. The side plates and frames were then erected by setting them against the edges of the transverse bulkhead and tack-welding them thereto. This worked out very well, requiring no bolts or other erection fittings. The short clips at the ends of the side frames were set and welded against the fore and aft deck and bottom frames. These held the sides out to their proper location ready to receive the balance of the plating.

Deck plates were then placed and, by means of weights, forced down and welded to the deck frames. The bilge plates were put on last. All inside surfaces were given two coats of paint before the last bilge plate was placed.

A modification of this erection procedure was used for the winch compartment. Bottom plates were placed on the blocks, the bottom frames set in position, and the bottom winch foundation webs were slipped over these frames, completing the bottom structure. The sides and ends were then set up, leaving the deck open at the top. The winch was set as a complete unit direct from a barge onto the web plates. The deck webs and frames were then placed and plated over. The winch itself was welded to the steel base, no bolts being used.

The bracketed supports for the ramps at the ends were assembled and welded and then erected as a unit on the end

of the floating bridge. The pivot structure was made up in a similar fashion.

The traffic plates, traffic guards and other deck fittings were then added to the structure. After the outside was completely painted, the bridge was launched as a finished structure.

Costs

The lowest bid for a riveted structure, which was quite different in plan from the welded unit actually constructed, was \$89,000 compared with the bid price of \$44,000 for the welded design. In addition, the proposed riveted structure would have had to be changed radically to provide the 22-foot roadway which was easy to secure with the welded hull. It is therefore estimated that a saving of about \$45,000 was made in using the welded design.

The net total cost to build this bridge was \$30,000, as follows:

Welding and tacking, 26,000 feet, labor	\$ 2,900.00
Weld wire and power	1,700.00
Steel, 440,000 pounds @ \$0.0254	11,170.00
Classification fee	500.00
Blocking and launching	1,400.00
Painting	1,900.00
Fittings	600.00
Shoes and rollers	1,430.00
Plans	800.00
Supervision	1,000.00
Burning gas, tools & miscellaneous equipment	1,300.00
Miscellaneous labor	5,300.00
Total	\$30,000.00

One of the economy features of this unusual bridge was the fact that its design made it possible to install the winch for opening and closing the bridge in the hull. With the structure as originally planned, it would have been necessary to install two winches on piles with expensive submarine cable and control signal apparatus to operate the swing mechanism. The bridge as built had a hull 10 feet deep the full length of the span, providing sufficient space and reserve buoyancy to accommodate a 75-hp double-drum winch, thus saving about \$25,000 in the cost of mechanism and operation for opening and closing the bridge.

The first shipment of steel for this bridge arrived on December 28, 1938, the hull was built complete and launched on February 18 and delivered on February 21, 1939. After delivery, about three days' work was done at the airport by two men to complete part of the winch installation. A gasoline-engine-driven arc welding machine was loaded onto the bridge and was used for the work at the site. That and a burning outfit were sufficient to complete the steel work as required. Ordinarily this work would have been done at the yard, but as the airport builders wished to use the bridge at once, it was delivered as soon as possible.

This article is abstracted from a paper winning an Award from the James F. Lincoln Arc Welding Foundation.

Preparing Aggregate For All Types of Roads

One of the new 1940 catalogs on road-building equipment describes and illustrates many models in the line of crushing and screening equipment manufactured by the Gruendler Crusher & Pulverizer Co., 2915-17 No. Market St., St. Louis, Mo. This catalog contains photographs and specifications of Gruendler jaw crushers, trailer-type and windrow portable jaw crushers, port-

able combination jaw and roll crusher plants, double roll crushers, portable straight-line crushing and screening plants, portable stabilizing plants, hammer crushers, screens, bins and complete portable and stationary plants.

Copies of this Catalog No. 600, and suggestions for the proper type of plant to prepare aggregate for any kind of road work, may be secured by interested contractors and engineers direct from the manufacturer by mentioning this magazine.



Heltzel Superior Heavy-Duty Road Forms have established a new low cost . . .

1. By building more miles of concrete slab.
2. By elimination of expensive upkeep and repairs.

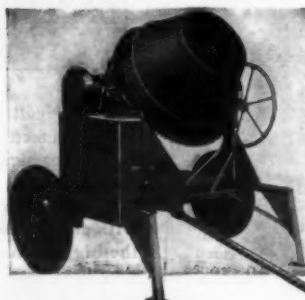
. . . and because Heltzel forms are easier to set and strip — form setting costs are reduced to a minimum. Write for complete information and descriptive literature. Catalog S-19.

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Heltzel
BUILDS IT BETTER

BINS. Portable and Stationary
CEMENT BINS. Portable and Stationary
CENTRAL MIXING PLANTS
BATCHERS (for batch trucks or truck mixers with automatic dial or beam scale)
BITUMINOUS PAVING FORMS
ROAD FORMS (with lip curb and integral curb attachments)
CURB FORMS
CURB AND GUTTER FORMS
SIDEWALK FORMS
SEWER AND TUNNEL FORMS
CONCRETE BUCKETS
SUBGRADE TESTERS
SUBGRADE PLANERS
TOOL BOXES
FINISHING TOOLS FOR CONCRETE ROADS

HELTZEL STEEL FORM & IRON CO.
WARREN, OHIO • U. S. A.



**New 3 1/2 E.D. (End Dump)
Lansing Trailer Mixer**

A sturdy, light, fast unit properly balanced for quick handling. Handy 42 1/2" shoveling height and 65" high. Weighs only 950 lbs.

LANSING COMPANY
LANSING, MICHIGAN

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BOSTON
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SAN FRANCISCO

LANSING K-4 CONCRETE OR UTILITY
CART
With Pneumatic-tired Wheels

• BUILT • FOR • STABILITY • SINCE • 1881 •

Are You Ready for "Spring Rush"?

. it's just around the corner

and it looks like another good building year. You must look to your Equipment for profits. The Lansing Line of Equipment for Contractors is well known for stability—and a wide range of uses. It includes Mixers, Scrapers, Hoists, Chutes, Mortar Boxes, and a complete line of Wheelbarrows. We invite your next Equipment inquiry.



LANSING MORTAR BOX
No. 806—In four sizes, from 2 ft. to 4 ft. width. 14 gauge steel



ONE OF
MANY
LANSING
BARROWS
F-4 1/2 WHEELBARROW



LANSING K-4 CONCRETE OR UTILITY
CART
With Pneumatic-tired Wheels



The new Blaw-Knox rehandling bucket.

"Dropping the Bucket" Won't Hurt This One

When digging materials that offer considerable resistance to the penetration of the bucket, or in excavating, it is customary practice for a crane operator to drop the clamshell bucket with considerable force in order to insure the advantage of good initial penetration. A new feature in clamshell bucket design, announced by Blaw-Knox Co., Pittsburgh, Pa., aims to reduce maintenance costs resulting from the practice of "dropping the bucket."

As a result of these impact and shock stresses, the head construction of the bucket frequently becomes loose and wobbly, especially when these indeterminate stresses are transmitted from the head pin to the corner pins through bolts or rivets. A practical solution to this problem has been found by mounting all four corner bars directly on the head pin, making the Blaw-Knox bucket probably the only single lever arm bucket on the market in which the direct communication of stresses from the head pin to the corner pin is handled without going through rivets or bolts.

The illustration shows a 2-yard rehandling bucket, weighing 5,250 pounds, handling average loads of over 5,250 pounds of 1½-inch crushed granite from a barge on the East River, New York.

New Double-Bucket Dirt-Moving Scraper

A new double-bucket cable-controlled Carryall scraper, rated at 14 cubic yards struck capacity and 18 yards heaped, has just been announced by R. G. LeTourneau, Inc., Peoria, Ill., and Stockton, Calif. This scraper is designed to give maximum capacity for loading under normal conditions without the aid of a pusher and thus utilize completely tractor power.

To minimize loading effort and increase yardage, the blade of the Model SU scraper is narrowed to 8 feet 6 inches, and a patented double-bucket bowl is used. The narrow cutting edge and two telescoping buckets give the effect of loading successively two small scrapers with a large tractor. After loading the first bucket to capacity, it is drawn back while the second is being loaded. This method of loading is designed to eliminate costly voids in the rear of the bowl and at the top of the tail-gate.

The sheaves for pulling the tail-gate forward in unloading are placed in a vertical position on the sides, where they keep the cable out of the dirt and give a center pull on the tail-gate. A single adjustment for the two bucket catches, with greater leverage, synchronizes the two catches and prevents the tail-gate and buckets from jamming.

The 8-foot 6-inch blade width permits an overall width of 10 feet 1 inch, reducing transportation problems. A new type of yoke gives greater strength and additional clearance for sharp turning of the front wheels, while higher sides

reinforced by five channels prevent the loss of pay dirt from side spill. Patented box-beam construction, special analysis steel and arc welding throughout give rugged strength with light weight.

A positive mechanical ejector tail-gate is said to remove completely the contents from the bowl bottom and sides, even when operating in wet and sticky material. This same load ejector controls the measured spreading of material from 1 to 16 inches. All dirt is pushed out the apron opening in front to eliminate voids in fills.

The Model SU scraper does not replace any Carryall in the LeTourneau line but is an addition to it. This new unit is designed to make possible more yardage with the same tractor by giving maximum capacity for loading under normal conditions without the aid of a pusher.

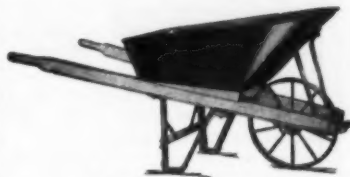
Complete information on our Road-side Development Awards for highway contractors may be secured by writing to the Editor.

STERLING BALANCED WHEELBARROWS

All trays have double thickness at corners. Both laps are crimped over a continuous butt-welded reinforcing rod.



NO. S-12—FOR DRY MATERIALS WITH PNEUMATIC TIRE WHEEL



NO. S-18—FOR CONCRETE

A COMPLETE LINE
OF STERLING
WHEELBARROWS
AND CONCRETE
CARTS

STERLING WHEELBARROW CO., MILWAUKEE, WIS.

"Imagine—
ME talking about
valve seat inserts!"



It is last summer, and here we are at the store picnic—about 100 of us girls. When all of a sudden, right after the peanut race, somebody yells—"Here comes the eats!" And sure enough, here they come—a whole truck-load of 'em, that pulls right up back of where Betty and Pearl and me are sitting on a bench.

Well, Betty is right in the midst of telling Pearl and me about what happened the other night at the casino, when the fellow that is driving this truck with the eats in it gets out and says kind of with a whistle—

"Boy, what a honey!"

Well, you could have cut the silence with an ice pick.

"Imagine that fresh guy," I says. "Let's just ignore him."

So Betty and Pearl they do just that, wandering away very hoity-toity.

But me, I didn't think it would do any harm to see what the guy looks like, anyway. So, with a stern frown on my face, I turn around. Just in time to hear him say—

"The sweetest job I ever saw in my life!"



So, instead of frowning, I glare, expecting to shrivel this masher once and for all.

And, I tell you, I got the shock of my life!

He wasn't looking my way at all! He was standing with his elbows on the front end of this truck of his, mooning like a love-sick calf! Can you feature that!

"Well, how about unloading some sandwiches?" I asks.

"Hello," he says, like he's in a fog. He wasn't so bad-looking.

"Ain't she a dream?" he says.

"Who?" I asks, innocent.

"That Ford," he goes on, looking at me like I was about as important as a can of hominy.

"Sweet runnin', quiet, comfortable, and the easiest job on gas and oil I ever drove. Come here once and just give this V-8 engine the double-O."

And before I knew it he had me by the hand and we were lookin' under the hood of that precious truck of his.

"Look at that engine," he says. "Tungsten steel inserts in every valve port, intake and exhaust."

"Wonderful," I says. And me not knowing a valve seat insert from a crepe suzette.

"Built for low-cost running, that's what I like. I've had trucks before, but, Sister, this Ford takes the cake."

"And I'll take a sandwich," I put in for a hint. But he didn't hear.

"Not only economical, but she's got power along with it. Flattens out hills like a bird. And she's as fast as Joe Louis' left hook. And besides, ain't she a handsome baby?"

This time I was hoping he meant me. But he didn't. So I saw I had to do something—and fast.

"I bet you wouldn't like to take a girl for a ride in that truck of yours, would you?" I asks, kind of twisting my toe in the ground.

"I sure would," he said, not letting go of my hand on account of I was holding his too tight, if you know what I mean. "Two can ride as cheap as one in this truck."

Well, that's how it all started. I think Ford Trucks are wonderful, too, now—just like Joe does.



FORD V-8 TRUCKS
and Commercial Cars

Ford Motor Company, Builders of Ford V-8 and Mercury Cars, Ford Trucks, Commercial Cars, Station Wagons and Transit Buses

Turnpike Required River Channel Change

(Continued from page 2)

started on this contract was to make the channel change of the Raystown Branch of the Juniata River, using a 1½-yard Lorain diesel shovel and a ¾-yard Bucyrus-Erie gas shovel loading to nine trucks on a very short haul. As soon as this work was completed, this outfit moved to the west cut where about 120,000 cubic yards of material was moved. On the outside of a sweeping curve in this channel change, heavy riprap 1 foot thick, and part of it grouted, was laid to prevent scour of the bank below the long fill between the east and west cuts. For the slight channel change in Dunnings Creek, the west bridge abutment excavation was used as a part of that channel change, requiring only a slight amount of extra structure excavation for the footings.

The East Cut

Two Osgood shovels, a 1½ and a 2-yard, were put into the east cut, loading to the contractor's own trucks which hauled across Dunnings Creek on two ramps. These ramps acted as cofferdams during the construction of five piers of Dunnings Creek Bridge which has a steel superstructure. Dunnings Creek is a flashy stream, two hours rain on the watershed meaning high water soon after. This resulted in washing out the ramps five times, in spite of the fact that a temporary channel change had been made to take care of the water during this part of the work. These ramps were maintained in good hauling condition for the trucks by constant attention with a Galion power grader.

In making the east cut, a sidehill cut of approximately 100,000 cubic yards, the shovel started at the top, making 10-foot benches, and working down a total of 87 feet, leaving a slope of 1½ to 1. The slope treatment, which is usually the last work done on the job, was actually the first on this as it would have been impossible for any equipment to get back to the top of the slope after the side-hill cut was completed. All of the excavated material from this 1,100-foot cut was hauled by ten to twelve trucks a total distance of 2,300 feet to form the long fill to the west of the bridge over Dunnings Creek. The rock in this cut was drilled with two Ingersoll-Rand wagon drills furnished with air by I-R portable compressors.

The West Cut

The cut at the west end was all in sand, a very clean material but not quite good enough for filler in grout. A Bucyrus-Erie 8-yard scraper handled practically all of the excavation of the 122,000 cubic yards of material in this cut. The same scraper was used to start the Raystown Branch channel change aided by T40 and T30 International tractors equipped with Bucyrus-Erie bulldozers.

The Big Fill

The fill to the west of Dunnings Creek was built up in 8-inch layers by spreading with two Caterpillar Sixty tractors with LaPlant-Choate pneumatic bulldozers. The fill was compacted with two Buffalo-Springfield and two Austin-Western 10-ton three-wheel rollers, and where backfilling was done behind a drainage structure, a 4-ton Austin roller was used at the top close to the structure after the air tampers had completed their work. Where rock was hauled into the fill it was laid in 18-inch layers and all of the rock was kept below this dimension. Somewhat of a problem was met in topping out this fill as most of it between the Dunnings Creek Bridge and the drainage structure mentioned was made with rock from the

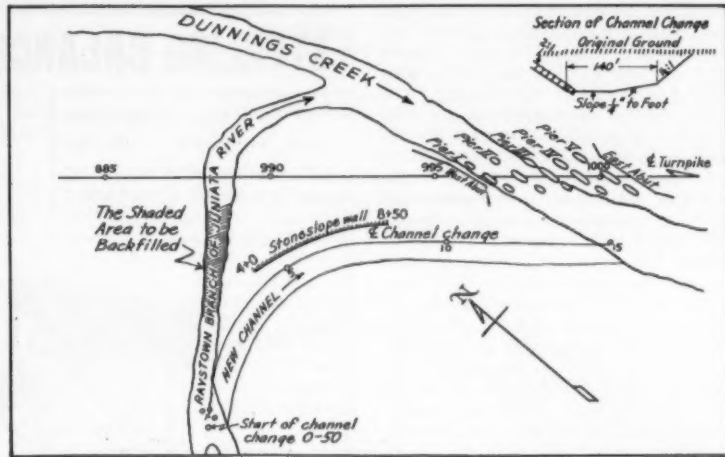


Diagram showing the channel change required on Contract 28 on the Pennsylvania Turnpike.

east cut. However, channel change excavation which had been wasted close to the fill was rehandled and used for surfacing the mid-section of the fill. A great deal of mud-capping was necessary to break up the large rock delivered to the fill to reduce it to specification size. Some red rock which was hauled in required blasting to break it up but in a few weeks air slaking reduced it to a relatively fine material.

Bridge Excavation and Concreting


A P & H 1½-yard shovel which was teamed for a while with the east cut outfit was used to handle the bridge excavation, aided by a P & H 700 clamshell outfit.

When it came time to pour the footings and piers, a Koehring 27-E paver was used to mix all of the bridge concrete which was placed with the P & H crane, using two 1-yard Insley buckets pouring to hoppers and chutes.

Personnel

Contract 28 was awarded to M. Bennett & Sons of Indiana, Pa., on its low bid of \$496,532.36. This contract involved the removal of 393,251 cubic yards of Class 1 excavation and borrow and the placing of 4,070 cubic yards of Class A concrete, 4,800 cubic yards of Class B concrete, and the use of 627,300 pounds of plain steel bar reinforcing and 1,510,000 pounds of fabricated structural steel in structures. For the contractor, E. J. Finn was Superintendent, and E. A. Rush was Resident Engi-

neer for the Pennsylvania Turnpike Commission.



You'll find this
MALL GASOLINE POWERED VIBRATOR
BEHIND JOB WINNING ESTIMATES IN 1940
SLASHES TIME, LABOR, CEMENT AND POWER COSTS!

You can seal your bids in 1940 with complete confidence if you have this fast and efficient MALL vibrator that places all types of quality concrete construction on a low-cost basis. It assures a denser, stronger, water-tight bond with reinforcement . . . prevents honeycombs and aggregate pockets and eliminates expensive patching. In addition, it permits the use of a low water-cement ratio concrete. A flexible shaft transmits power to the vibrator which delivers 3000 to 7000 frequencies per minute. No generator set is required.

Write TODAY for FREE demonstration and full information.

INTERCHANGEABLE ATTACHMENTS CAN BE FURNISHED FOR

- ★ SURFACING
- ★ SAWING
- ★ DRILLING
- ★ PUMPING
- ★ SANDING

MALL TOOL COMPANY
7743 South Chicago Avenue
Chicago, Illinois
Offices and Distributors in all Principal Cities



Placing concrete on heavily reinforced deck slabs.



What makes that **BLAW-KNOX Concrete Bucket** operate so easily?

Why—the discharge gate is a rubber pad running on roller bearing rollers.

HM—Pretty Slick! no other Bucket like it.




- Controllable discharge, Blaw-Knox CONCRETE BUCKETS are a popular concrete placing unit. Used by contractors everywhere.

Send for a copy of the catalog on Blaw-Knox Concrete Buckets, No. 1586.


BLAW-KNOX DIVISION of Blaw-Knox Company
FARMERS BANK BUILDING · PITTSBURGH, PA.

BLAW-KNOX Roller Gate
CONCRETE BUCKETS



"Yes—we get both wet and dry batches from this **BLAW-KNOX CENTRAL MIXING PLANT**.

It gives us both mixed concrete and dry batches for compartment trucks or truck mixers."



No matter how varied and involved the concrete requirements on your job might be—Blaw-Knox will design a Central Mixing Plant to solve your problems economically.

Stationary or floating plants, manual or automatic in operation, have been furnished for hundreds of jobs. See them in Catalog No. 1566.

BLAW-KNOX CENTRAL MIXING PLANTS
BLAW-KNOX DIVISION OF BLAW-KNOX CO. FARMERS BANK BLDG. PITTSBURGH, PA.



The new Adams hauling scraper.

New Hauling Scraper Seen at Road Show

Among the new equipment introduced to the road-building industry at the A.R.B.A. Road Show was the new and improved line of hauling scrapers recently announced by the J. D. Adams Co., Indianapolis, Ind. Three new models are available: the No. 30 of 3-yard capacity for use with 30 to 40-hp tractors; the No. 50 of 5-yard capacity for tractors of 40 to 60 hp; and the No. 100 with a capacity of 10 yards to be used with 70 to 80-hp tractors.

These scrapers are double-cable controlled, being operated from a hoist or winch attached to the rear of any crawler tractor and operated by the tractor operator. In addition to their ability to load quickly and dump readily, the manufacturer claims the following operating and mechanical advantages: weight distribution which puts approximately equal weight on all four wheels when the scraper is loaded; four large low-pressure tires which provide flotation with easy draft over soft material; unusual clearance under the bowl and axles for clearing dumped loads; and low bowl pivot point which maintains a uniform blade position in spreading and provides a low center of gravity. Double-cable control provides positive control of the depth of the spread, independent control of the apron for loading or spreading, and permits leveling pits, dumps or runways with the bowl carried in dump position. A pusher bar is available for mounting across the rear of the frame as optional equipment.

New bulletins describing the three

models of these Adams hauling scrapers may be secured by interested contractors and state and county highway engineers direct from the manufacturer by mentioning this magazine.

Heavy-Duty Tractor At A.R.B.A. Show

The Caterpillar Tractor Co.'s announcement of new equipment at the Road Show in Chicago was a new 75-hp diesel tractor, engineered specifically to increase production and lower operating costs. According to the manufacturer, the features of this new D7 lessen the energy expended by the operator, thus enabling the driver to get the maximum amount of work out of the machine, and in addition give the tractor longer life and lower upkeep costs.

To reduce operator fatigue, the new D7 has finger-tip steering. A light pull on the steering clutch lever is sufficient to steer the 23,500-pound machine. These steering clutches are actually operated hydraulically by a separate control unit driven from the upper transmission shaft, the only work done by the operator being the opening of a valve. A streamlined hood and driver's seat located high and well forward on the tractor give a clear view of the work ahead and behind. Small seats on both the left and right-hand arms of the main seat provide a comfortable place from which the driver can operate rear power-controlled equipment.

The frame and steering clutch case are of welded steel construction, built into a one-piece unit. The durability of gears, steering clutches and flywheel clutch have been increased, and the flywheel and steering clutches have metallic facings designed for long life and freedom from adjustment.

Power is provided by a heavy-duty 4-cylinder valve-in-head Caterpillar diesel engine with a 5 1/4 x 8-inch bore and stroke, with a belt horsepower of 87 and a drawbar horsepower of 75. Fea-

tures of this engine are rugged construction, effective sealing against dirt, freedom from operating adjustments, a lubricating oil cooler, statically and dynamically balanced five main bearing crankshaft, quick-acting governor, accessibility, and the ability to burn a wide range of diesel fuels.

To provide a broad range of speeds, the D7 is regularly equipped with either of two 5-speed transmissions. The low-speed transmission provides five forward speeds ranging from 1.4 mph to 5 mph, while the high-speed transmission has speeds from 1.4 mph to 6 mph. For each of the first four forward speeds, there is a corresponding but slightly higher reverse, obtained by means of a quick reverse shifting lever which works independently of the change speed shifting lever. It is therefore possible to change from any of the first four speeds to the corresponding reverse speeds merely by pushing forward on one lever, a feature which is particularly advantageous in bulldozing.

Complete information on this new D7 tractor may be secured by interested contractors and engineers direct from the Caterpillar Tractor Co., Peoria, Ill.

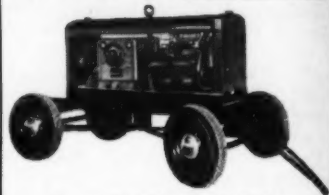
Illinois Buys Fleet Of Highway Graders

The Division of Highways of the Illinois Department of Public Works recently purchased seventeen more Austin-Western 99 motor graders. All of these units, which drive and steer with every wheel, were fitted with cabs, scarifiers, and 13.50-20 rubber tires. Eleven of them were also equipped with Austin-Western giant V snow plows and snow wings.

Every adjustment of the circle and moldboard, steering and the raising and lowering of snow plow, snow wing and scarifier is accomplished by smooth hydraulic power controls from within the cab of these graders.

An entirely new 24-page catalog completely describing and illustrating these 99 graders has just been issued by the Austin-Western Road Machinery Co., Aurora, Ill. Copies of this catalog, which covers the various mechanical features of the 99 as well as the wide variety of services to which it may be put, may be secured from the manufacturer.

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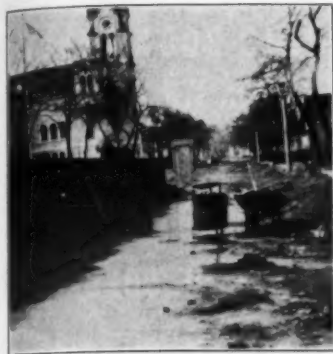
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Concrete Paving In Winter Months

Forest Park, Ill., Develops A Lightweight Sectional Housing to Protect New Concrete from the Cold

† MUCH concrete paving has been delayed because of threatening cold weather, and the difficulty of protecting the pavement. A little more than a year ago Forest Park, Ill., a suburb of Chicago, embarked on a program of cement-bound-macadam construction which ran through sub-zero weather, but was adequately protected against freezing, first by heating the materials and then by covering the new pavement with sectional portable housing, the interior of which was heated with salamanders. This is an idea which could be studied advantageously by paving officials and contractors.

The housing was built of separate roof and roof-support sections small enough so that two men could easily handle any section. Enough sections were built to cover at least one day's run. The roof sections were 4 x 8-foot plywood panels, stiffened at the edges laterally and longitudinally by 2 x 2-inch strips. These were nailed to a framework consisting of 2 x 2's about 8 feet long, nailed at right angles to 2 x 4's at one end to form legs. The framework was stiffened longitudinally by knee braces and laterally by 2 x 4's just 4 feet long. Roof panels were given a slight camber to allow rain and melted snow to drain off.

Two roof panel and framework sections were opposed to make up complete housing for covering 4 running feet of pavement. The sections were supported

at the pavement center by horses built up of 2 x 4's just 4 feet high. When housing sections were in place, side panels of 4 x 4-foot plywood stiffened with 2 x 2's were hung in the side openings between the framework legs, and four 4 x 4-foot panels were placed at the housing ends to enclose entirely the newly laid pavement. To allow for variation in width of pavement being laid, sections of plywood 2 feet wide with center stiffeners were provided. All plywood exposed to the weather was oiled to prevent warping.

When the area to be protected was entirely enclosed, straw was placed around the bottom of the enclosure and salamanders were set inside at 20-foot intervals. As side and end sections of the housing were easily removable, it was a simple matter to service the heating units. Temperature was controlled by varying the number of salamanders. Although there was some condensation, it was found advisable to increase the humidity inside the housing by placing water containers near the salamanders.

As the cement-bound-macadam pavement was placed, the housing sections farthest away from the work under construction were detached and moved ahead to cover the newly finished work. In this way the pavement was kept at optimum curing temperature at least 24 hours. As the housing was moved ahead, the pavement was covered with burlap and straw and kept covered for 14 days. This method of protection cost less than 2 cents a square yard.

On this particular job the work was done with motor fuel tax funds by Forest Park, Ill., with relief labor. Suhr, Berryman, Peterson and Suhr were the engineers for Forest Park, and D. V. Holmer was Superintendent. We are indebted to the Portland Cement Association for the illustrations used with this article.



Placing a roof panel in position in housing to protect concrete paving from low temperatures.

after the nut is tightened. With thread play thus eliminated, the nut can not work loose under vibration, operating stresses, or because of wear of surrounding parts.

The new types of nuts are designated as thin hexagonal, spline, internal wrenching, countersunk and counter-bored one-lug anchor, countersunk and counter-bored two-lug anchor, countersunk corner anchor, bracket anchor, floating right-angle anchor, and floating basket anchor. With variations in sizes, thread systems and materials, 160 new standard items are offered.

An illustrated catalog, containing complete listings and a graphic explanation of the Elastic Stop principle, may be secured by those interested direct from the manufacturer by mentioning this magazine.

New Truck-Crane Boom Folds for Quick Moves

A new boom, developed by Lee Crane Service Co., Boston, Mass., for service on P & H 250 truck cranes, recently had an interesting tryout on a high school job at Gloucester, Mass., where it was called upon to erect a tower 130 feet above the ground. The boom on this truck crane is 110 feet long, which is an ungainly length when the truck has to be moved. To overcome this trouble the boom is folded into three sections by means of hinges.

On the Gloucester job, the performance of the crane was not demonstrated so much from the capacity standpoint as from reach. The heavy lifts were about 7½ tons. On reach, the 80-foot boom worked many times at well below

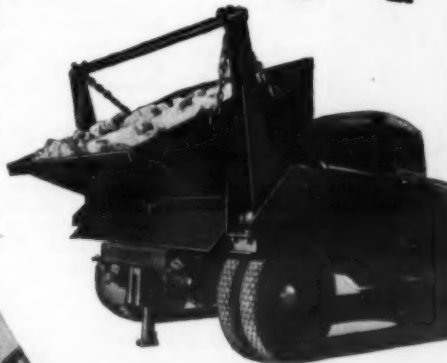
New Types of Nuts Are Self-Locking

Nine new types of nuts, all of which embody the basic Elastic Stop self-locking element, a resilient non-metallic collar which is built into the head of the nut, have recently been announced by the Elastic Stop Nut Corp., 1015 Newark Ave., Elizabeth, N. J. This collar, in resisting the entrance of the bolt or screw, forces the thread faces into a pressure contact which is maintained

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This shows the 1940 Model "CH" of the Brooks LOAD LUGGER, mounted on a 1½-ton truck with a 2-yard bucket. It hoists . . . hauls and dumps, automatically. It is the biggest package of dump-truck economy on the market. Be sure to get the complete facts at once.

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5-Ton 4, & 24 to 1	110 lb.	\$ 75
15-Ton 4, 19 & 109 to 1	650 lb.	\$250

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the 45-degree angle, while the 110-foot boom was used to erect the tower on the building which is 130 feet above the ground. The last section was 20 feet long, and since the boom was not sufficiently long to reach the top, a hitch on this section was made at the middle. When the section was hoisted to the maximum lift of the crane, this section was pivoted about its middle by means of men on the ground with guy ropes attached to the foot of the section. In this way, the foot of the section was brought into place.

Before these truck cranes arrived, it would have been necessary to handle this job either by stiffleg derricks, or by crawler cranes with equally long booms. Further information regarding this innovation may be secured direct from Harnischfeger Corp., 4419 W. National Ave., Milwaukee, Wis.

The importance of proper lubrication can not be stressed too often. If you have any special lubrication problems, write the Editor.



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DEALERS WITH STOCKS IN ALL PRINCIPAL CITIES

Road-Mix Used for Ottawa County Roads

(Continued from page 18)

were \$129,960.99 for maintenance which included considerable maintenance-construction such as road-mix improvements. The amount that was returned to cities and villages was \$44,780.27 and the county's share for maintenance was \$41,539.82, the percentage mentioned in the preceding paragraph.

County and State Road Mileage

Within the area of 564 square miles there are 1,186 miles of township roads that have been taken over for maintenance by the county. Then there are the 211.75 miles of county roads and the 93 miles of state roads for which the county holds a state maintenance contract.

Construction of County Roads

The major construction of roads in Ottawa County is with road-mix. The method is to prepare a base 22 feet wide of compacted gravel 4 inches thick on sand and 8 inches on clay a year in advance, as there is nothing that will really test out a base better than traffic and a winter's searching freezing and thawing. The base is primed with 0.3 gallon per square yard of tar 22 feet wide and after being allowed to penetrate for a few days, the bank-run or crushed gravel, with a maximum size of $\frac{3}{4}$ -inch, is spread with spreader boxes to a width of 12 feet and the proper thickness to allow for a 1 or 2-inch surface 20 feet wide when completed.

The tar for the mixing process is applied in two shots amounting to a total of 14 gallons per cubic yard of mixed material. The gravel pits all are located in the eastern section of the county so that projects in the western section have a 15-mile haul. For mixing the tar and aggregate, an Adams Retread Paver is pulled through the material, making about four trips for each application of the binder material. The material is then spread directly with a tractor and pulled grader without windrowing. The spread material is rolled with a 7-ton roller and then traffic is allowed to use the road for two weeks after which 0.2 gallon seal of tar and about 10 pounds of sand are applied.

Central and District Garages

The central garage and office building is an attractive structure two stories high of Haydite block faced with brick. On the ground floor at the front is the general office open to the public, then the County Engineer's office, the Board Room for meetings of the County Commissioners, the office of the Maintenance Superintendent and the office of the timekeeper and stock-man.

On the second floor of the office building is a drafting room, an assembly room used at present for storage, and the mimeograph room. A concrete vault running up through the two floors is used for the storage of county land records and other valuable papers. The offices have rubber tile for the floors, and the corridors are all terrazzo with the base boards and window sills of the same material as the halls, and the floor curved into the base board for cleanliness. Concealed steam heating is used for the entire building and is supplied by a boiler in the shop. Venetian blinds at all the windows eliminate the need for roller curtains or outside blinds to regulate the light in the offices. The windows all have steel sash and, in fact, the only wood in the entire office structure is in the doors and a few of the chairs, most of the chairs being of aluminum. The office structure was designed by the County Engineer with the assistance of an architect employed temporarily.

Immediately behind the office building and connected to it is the garage. Outside and back of the building on a siding is an 18,000-gallon gasoline storage tank from which the gasoline for the use of the other two garages is trucked by the county. The first section of the garage structure is used for a sign paint shop where one man is busy all the time repairing signs, although at times he goes out on the road to touch up those signs that need not be brought to the central garage for repair or refurbishing. The stock-man is also a sign painter and assists when there is a rush of work in that section.

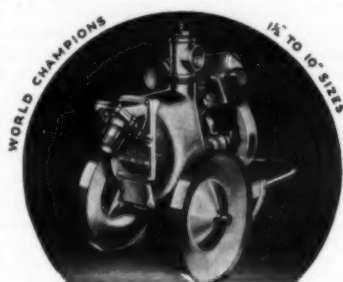
In the general garage there is storage space for tires and skid chains in racks and a work bench with grinder, an acetylene and an Adams electric welder, a power-driven grindstone, lathe, power hack saw, shaper, drill press, hydraulic press for gears, a forge and an anvil. The personnel in the garage consists of the garage foreman, four mechanics and a blacksmith. They take care of most

of the repairs on the equipment for all the garages although there are two well-trained mechanics at the Zealand garage who do a great deal of work on their own equipment stored there.

In 1931 a storage garage 80 x 120 feet clear was added at right angles to the other structures so that the entire structures now are L-shaped. This storage garage is filled to overflowing at night with the trucks as they come in from work. In the winter when they are all equipped with plows, it is a magician's job to pack the trucks in successfully. The storage roof is of interlocking steel construction with a tar and gravel top.

The gas pump for the trucks is located just outside the door of the garage. All trucks are gassed as they return to the garage at night and the amount required to fill the tanks charged to the work done by the trucks that day. A complete equipment-rental system is used for all the work and equipment. It uses

(Concluded on next page)

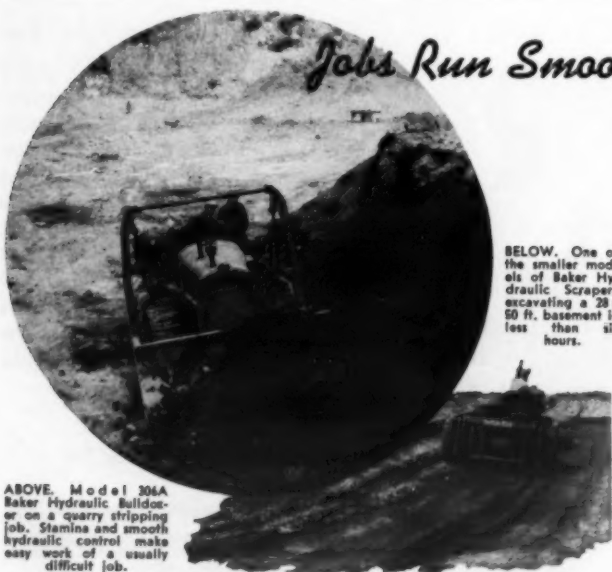


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County Highway Work In Ottawa County, Mich.

(Continued from preceding page)

the same rates as set up by the state for payment for the use of county equipment in the maintenance of state roads. A wide concrete roadway about 100 feet long is the approach from the street to the garage.

In the yard miscellaneous materials are stored and there are sheds for cement, calcium chloride and junk.

Snow Removal

As remarked earlier in this article, the snow in Ottawa County is variable, running from a minimum of 61 inches to as much as 11 feet. A very bad snow storm in the winter of 1936 closed one section of U.S. 31, the main north and south highway through the county, for three or four days, but in the winter of 1938-39 the snow for the entire winter was the minimum.

In attacking the snow-removal problem, the county forces try to start with the storm and keep a little ahead of it. The aim is to keep the curb and center line visible for the guidance of drivers at all times. Underbody scrapers on trucks operating at 20 to 25 miles per hour are successful in removing the snow up to a depth of 4 inches. Then the blade plows start working at the same speeds and when the snow gets too deep and the road must be opened wider because of the accumulation the big V plows are put into action. In the heaviest snows, one truck is not sufficient to handle the V plows so they are sent out with a tandem pusher hitch. The V plows cannot handle more than 4 to 5 miles of road in heavy snow.

The snow-plowing equipment is put out on the state roads first, then the county main roads and last the township roads. The geographical location of the county is such that it gets both heavy dry snows and also sleet in different storms. There are six sanders of the rotary disk type for use behind the trucks but main reliance is placed on hand spreading, using sharp sand and throwing the sand in streaks across the road at intervals instead of a light covering over the entire road. The loads go farther this way.

Equipment

The major portion of the county equipment is in trucks and a few automobiles for the administrative section. The trucks include: 8 Indiana 2-ton, 9 Indiana 3-ton, 2 Reo 1½-ton, 2 Indiana 1-ton, 1 Littleford distributor on an Indiana truck, 7 Indiana 3½-ton, 8



C. & E. M. Photo

The 80 x 120-foot storage garage for Ottawa County trucks.

Dodge 1½ ton, 4 Chevrolet coupes, 4 Duplex 3½-ton, 1 Indiana 1½-ton, 1 Dodge pick-up, 2 Duplex 3-ton, 3 Plymouth coupes, 5 GMC 1½-ton, 1 Studebaker coupe, 1 Michigan truck shovel and 2 Buick sedans. Then getting into the construction and maintenance equipment there are: 1 Koehring crane, 2

Northwest cranes and shovels, 1 Wehr grader, 7 large Adams pulled graders, 4 International tractors, 1 Caterpillar Fifty, 1 Caterpillar 2-ton tractor for use in the shop, 6 Adams patrol graders, 1 air compressor, 6 Littleford tar kettles, 1 Austin 7-ton 3-wheel roller, 4 small concrete mixers, 2 rotary scrapers, 1

Willett, 1 Root and 9 Pneu-Hydro underbody scrapers, 28 snow plows, 1 pile driver with drop hammer for use with the cranes, and 9 equipment trailers from 35-ton down.

Personnel

Carl T. Bowen is County Engineer of Ottawa County, Michigan, and has held this office for 18 years. Ray Fox is Maintenance Superintendent and L. W. Reghel is Deputy County Clerk, an office which is in reality the clerk or secretary for the County Highway Commission.

Mr. Bowen has been very active in road construction affairs throughout the state as well as in the American Road Builders' Association. He was recently elected to the Board of Directors of the County Officials' Division of the A.R.B.A., and last year was President of the Michigan Association of Road Commissioners and Engineers as well as President of the Michigan Good Roads Federation which is the Michigan Chapter of the A.R.B.A.

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New Informative Bulletin On Arc-Welding Electrodes

A new bulletin on General Electric arc-welding electrodes has recently been published by the General Electric Co., Schenectady, N. Y. Prepared as a guide for the proper selection of electrodes, the publication also gives important suggestions on welding technique with different types of electrodes and presents some of the factors influencing their choice. Complete descriptions are given of the twenty types of General Electric electrodes, their applications, sizes, re-

commended currents, arc voltages, and identification.

Copies of this 40-page bulletin GEA-1546F, which also contains the characteristics of deposited weld metal, charts of joint forms and positions, and a handy estimator for electrode quantities, may be secured direct from General Electric.

Three New B-E Bulletins On Shovels and Draglines

Bucyrus-Erie Co., South Milwaukee, Wis., has recently issued three new well-

illustrated bulletins on some of its excavating units. Bulletin No. DL-1 describes the mechanical and structural details of B-E draglines in various sizes, with photographs illustrating these details as well as showing a number of interesting views of draglines at work all over the world.

A 32-page bulletin No. 33B-3 is devoted to the Bucyrus-Erie 33-B 1¼-yard shovel, dragline, clamshell and crane. Mechanical and structural details are fully explained and illustrated by the use of close-up photographs. Field views showing the 33-B on the job

are also included.

The features of the 100-B 4-yard electric shovel and dragline, which include new welded front-end construction, use of modern alloy steels, big operating range, full-revolving advantages, increased mobility, and easy convertibility to dragline or crane, are explained and clearly illustrated in Bulletin No. D-1007.

Copies of any or all of these bulletins may be secured by interested contractors and engineers direct from the manufacturer or from CONTRACTORS AND ENGINEERS MONTHLY.

NO SLACK-SEASON LAYOFFS FOR

Austin Western
"99" POWER GRADERS

They Drive and Steer on All 4 Wheels

1. HEAVY DITCHING
2. FINISHING
3. LOADING
4. MAINTAINING
5. TERRACING AND DRAINAGE
6. ROUGH GRADING
7. SCARIFYING
8. SLOPING
9. SNOW PLOWING

New Snow-Plow Catalog

The new and complete catalog on Frink Sno-Plows, which are made in the East by Carl H. Frink, Clayton, N. Y., and in the West by the Davenport Besler Corp., Davenport, Iowa, has recently been issued. The various features of Frink V-type snow plows and wings are described and illustrated, and a section is devoted to the Frink selective power hydraulic control which is available with every type and size of Frink Sno-Plow and leveling wing. Other Davenport-Frink snow-removal equipment, includ-

ing a reversible blade plow, one-way blades, leveling wings, and a snow broom are also described and illustrated.

Copies of Catalog No. 39E may be secured by interested state and country highway engineers direct from the manufacturer in their section of the country.

Read this and subsequent issues carefully for descriptions of new equipment announced for 1940 at the A.R.B.A. Road Show in Chicago and write for further information.

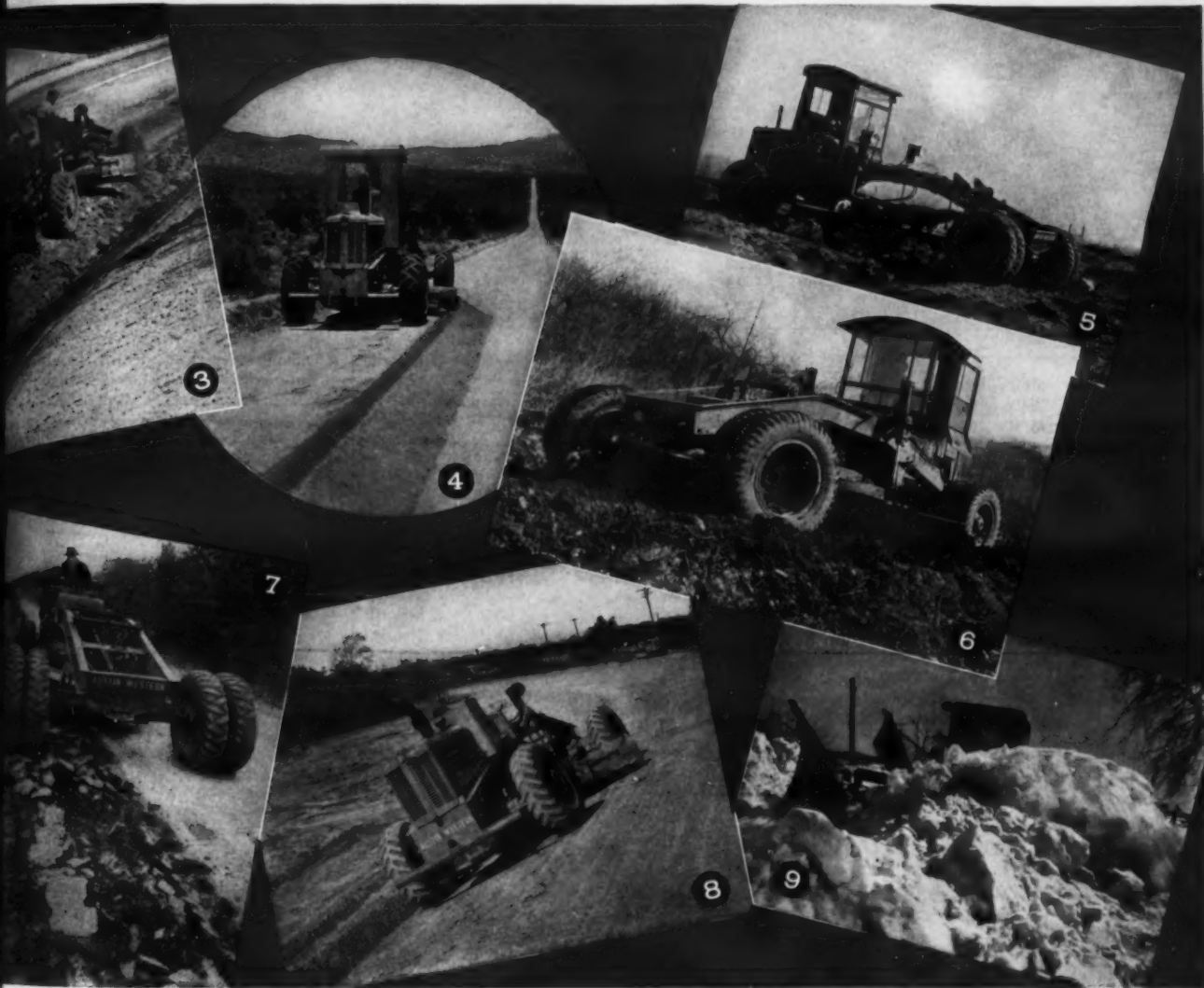
All-Wheel-Drive Units Designed for Tough Going

The inspiration for the development of Marmon-Herrington all-wheel-drive vehicles came out of the World War, when present officials of the company saw the industrial, as well as military, need of vehicles which would not bog down in any type of going.

The new 1940 models of Marmon-Herrington all-wheel-drive Fords as well as the heavy-duty high-traction vehicles are now being delivered. In the Ford line, many engineering changes and im-

provements have been made which add to the stamina and performance of these vehicles, according to the manufacturer, and make them particularly adaptable to road building and maintenance, snow removal, and similar jobs where the going is difficult and positive traction is important.

A new catalog describing and illustrating these Marmon-Herrington all-wheel-drive Ford units is now available and may be secured direct from the Marmon-Herrington Co., Indianapolis, Ind., by mentioning CONTRACTORS AND ENGINEERS MONTHLY.



SOON YOU'LL HAVE TO STEP ALONG ON LOTS OF JOBS LIKE THESE . . .

. . . but you can always bank on a head start, with a "99" . . . and it makes no difference whether the ground is softer, the ditches deeper or the banks higher; or whether fills, subgrades, surfacing or shoulders are a part of your schedule.

The reason is LIVE POWER in every "99" wheel combined with REAR WHEEL STEER. Live power and a rear steer that stubbornly holds grader against the work; that offsets the frame to sidestep windrows; that neutralizes side draft and whose teamwork with other "99" features enables this powerful ma-

chine to move bigger bladefuls faster and farther.

It's real economy to use a "99"—it can do so many things so much better—and when it comes to cutting fuel costs, holding down upkeep and dependable day in and day out service—the "99" takes front rank position. Look into this machine; try one out on your jobs. You will be amazed at its ability to outperform conventional rear drive front steer graders. The Austin-Western Road Machinery Co., Aurora, Illinois.



TWENTY-FIRST ANNUAL CONVENTION
ASSOCIATED EQUIPMENT DISTRIBUTORS
CHICAGO, JANUARY 27, 1940
PHOTOGRAPH BY CONTRACTORS AND ENGINEERS MONTHLY

Roadside Planting On County Highways

Keeping pace with new highways as they are constructed, the roadside development program of Wayne County, Michigan, is being carried on in as practical a manner as possible, according to the 32nd Annual Report of the Board of County Road Commissioners.

As one of the most important considerations in the program, roadside planting has been consistently followed each year, restoring to the almost treeless highways of a few years ago the shade and protection so much in demand by motorists and so beneficial to the modern well-constructed road bed. The most hardy, long-lived and pest-free species are planted with full consideration given to the existing soil conditions. For the most part, native trees and shrubs are given preference in the open country, while near and through municipalities, appropriate kinds of domesticated shrubs are included.

All trees and shrubs are purchased from reliable nurseries only on the basis of sealed bids and rigid specifications. The award is made to the low bidder according to the species and a surety bond in the full amount of the purchase price is required from each vendor before orders are issued as a guarantee that the proper stock will be received in accept-

able condition. All stock is inspected at the nurseries before delivery and again at the county receiving yard to insure against diseased or insect-ridden material and to avoid misunderstanding.

Both formal and informal types of planting are carried out, depending on the requirements and location. More open planting is followed in the rural districts than through or near municipalities. As a part of the regular program, trees which have died are replaced, and seeding and sodding of slopes and bare areas are done where necessary.

At the end of 1938, approximately 530 miles of Wayne County roads had been planted with trees, exclusive of a comparatively small mileage of state trunk lines. More than 70,000 deciduous trees, 3,200 evergreens, and 156,000 shrubs have been used in this work.

New A. E. D. Officers

The following officers for the coming year were elected at the Annual Meeting of the Associated Equipment Distributors in Chicago on January 26: President, Ralph R. Nixon, Nixon-Hasselle Co., Chattanooga, Tenn.; 1st Vice President, William G. Morgan, Geo. F. Smith Co., St. Louis, Mo.; 2nd Vice President, Henry G. Ferris, Hofius-Ferris Equipment Co., Spokane, Wash.; and

Secretary-Treasury, A. C. Blaisdell, Blaisdell Equipment & Supply Co., Cincinnati, Ohio. The directors are H. O. Penn, H. O. Penn Machinery Co., New York City; Harry E. Shaw, Service Supply Co., Philadelphia, Pa.; Terry Holmes, Holmes-Talcott Co., Hartford, Conn.; E. P. Phillips, Phillips Machinery Co., Richmond, Va.; A. E. Hahn, Richmond, Va.; A. L. Lott, Conley-Lott-Nichols Machinery Co., Dallas, Texas; T. W. Harron, Harron, Rickard & McCone Co., San Francisco, Calif.; D. M. Edgerly, Interstate Machinery & Supply Co., Omaha, Nebr.; and James Goggin, Cunningham Ortmayer Co., Milwaukee, Wis.

The photo above was taken at the

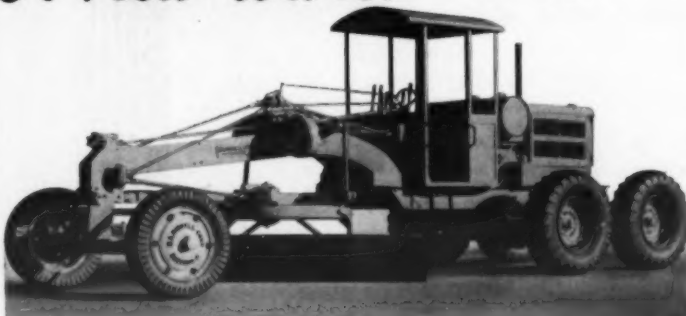
luncheon meeting attended by the allied manufacturers as well as distributors.

Aercoil OIL BURNING CONTRACTORS' EQUIPMENT

- KETTLES FOR TAR, PITCH & ASPHALT • EMULSION DISTRIBUTORS
- POWER SPRAYS • LEAD MELTING FURNACES • WEED BURNERS
- TORCHES & BURNERS

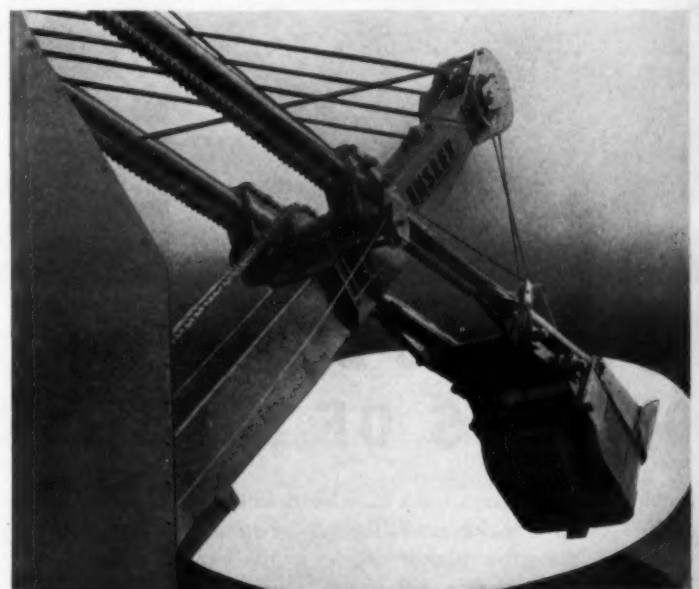
Send for FREE Bulletin No. 100-C
Aercoil Burner Co., Inc.
West New York, New Jersey
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A New Warco Diesel Or Gas



All modern features—leaning front wheels, full reversing circle, 90° angle banksloping blade range, full power control including power and hand steering.

WARCO W.A. RIDDELL CORPORATION
BUCYRUS - OHIO



the Improved INSLEY type K

The Improved Insley Type "K" is, by far, the best machine we have ever built. As the product of the Pioneer Builders of Smaller Excavators, the Insley Type "K" Excavators and Cranes have always been the outstanding machines in the industry.

INSLEY MANUFACTURING CORPORATION, INDIANAPOLIS, IND.

The INSLEY HK 1 1/2-yard Excavator

This improved heavy-duty shovel, shown for the first time at the A.R.B.A. Show, includes many features that assure more paying yardage at a lower yardage cost than most machines of larger rated capacity. Before investing in a new shovel, be sure you look at this outstanding machine, which boasts such big shovel features as independent chain crowd, reversible two-speed front drum, fully enclosed gears running in oil, temperature-controlled cab. Get the complete story. Write for Bulletin No. 146-C. Insley Manufacturing Corporation, Indianapolis, Indiana.

Explosives Storage Should Be Both Suitable and Safe

Many users of explosives do not obtain full dollar value from their explosives because of improper storage, Cecil Fisher, Manager of the Storage and Delivery Section, Explosives Department of E. I. du Pont de Nemours & Co., said in an address before the National Safety Congress.

"Explosives left or stored where they can absorb moisture will have a lowered efficiency which means loss of money value to the purchaser," Mr. Fisher said. "Explosives stored in damp underground locations, left on damp ground, or in the open air unprotected from the elements will not give the most satisfactory results and may cause misfires."

Speaking on the subject of safe storage and handling of explosives, Mr. Fisher pointed out that storage often may be safe but unsuitable, or it may be suitable to protect the explosives, but absolutely unsafe. "Suitable storage is not a question of individual opinion, but is based on the characteristics of the explosives and has been standardized through years of experience. It may be defined as protection from moisture, the weather, fire, excessive heat, theft and entry by unauthorized persons."

The location of the magazine should be such that in the event of an explosion of its contents, there will not be any injury to persons or damage to buildings or other property in the vicinity of the magazine. The American Table of Distances specifies the distance magazines containing given quantities of explosives should be located from inhabited buildings, railways and highways. If there is no barricade around the magazine, these distances should be doubled.

If more than one magazine is built in the same location, each magazine containing between 5,000 and 25,000 pounds of explosives (excepting blasting or electric blasting caps) should be at least 200 feet from any other magazine, and if more than 25,000 pounds of explosives are to be stored in a magazine, the distance between such magazines should be increased 2 2/3 feet for each additional 1,000 pounds over 25,000 pounds. The distances between magazines may be reduced by one-half if the magazines are effectively protected by barricades.

While the cost of operation is an im-

portant factor in any business, magazine location safety must be considered first, as the probable loss of life and the cost of other damage is far out of proportion to the amount involved in the additional expense of operating a safely located magazine.

Particular care should be taken in the selection of men chosen to handle explosives; most experienced men are familiar with the hazards met with in the use of explosives, but some are careless and negligent of these hazards. Carelessness, ignorance and false bravery are characteristics that the explosives user can well do without, and men having these characteristics which endanger the lives of others should not be permitted on the loading crews.

Improved Iodine Antiseptic

A non-alcoholic solution of iodine which, it is claimed, has a number of advantages over the alcoholic tincture of iodine, is now available from the Davis Emergency Equipment Co., 55 Van Dam St., New York City. This preparation, known as Isodine-Davis, has the same antiseptic properties as the tincture of iodine but is less painful when applied, does not burn or destroy the tissues, and penetrates more deeply, according to the manufacturer.

Isodine-Davis is supplied in 2 and 10-cc applicators, and in unit cartons containing 10 swabs, each of which represents an individual treatment, for use in first-aid kits and emergency first-aid stations.



'Ramsey'
3-SPEED
ALL-STEEL
HAND WINCH

2 Sizes

5-ton capacity — 135-lb spools, 125' of 1/2" cable, \$75.
3-ton capacity — 75-lb spools, 150' of 1/2" cable, \$55

POWER FOR HEAVY LOADS. SPEED FOR LIGHT LOADS. Gear Ratios: 25:1, 4:1, 1:1.

Manufactured by
RAMSEY MACHINERY CO.
1626 N. W. THURMAN STREET, PORTLAND, OREGON

Write for circular and name of nearest dealer
A few territories are open for live distributors

THIS YEAR AS ALWAYS

C.M.C.
GIVES YOU

MORE FOR
Your
MONEY

★ More Dependability ★ More Improvements
★ More Features ★ More Profits For Users

MODERN 1, 2 and 3 Bag Non-Tilt Trailers. 2 or 4 wheel interchangeable. End or side Discharge. Lighter yet stronger, faster, handier—Drums can last a lifetime with renewable liners.

NEWEST 3 1/2 and 5S Tilting Trailers... End or side discharge. Also brand new 3 1/2 Non-Tilt Trailer. Lower charging height (none lower). Choice of air or water cooled engine.

ADDITIONAL MODELS of CMC and Wonder Plaster—Mortar and Dry Concrete Mixers. With or without power loaders. Unmatched in efficiency, dependability and as money makers on the job.

EFFICIENT Portable Bituminous Mixers built in two sizes—6 and 10 cu. ft. New and improved power tilt—renewal abrasion resistant steel drum liners. No. 10 available with power loader.

EXCLUSIVE Dual Prime Centrifugal Pump. Twin priming actions—100% automatic non-clog design. Sizes from 1 1/2 to 10". Also special triple prime well point Pumps in 4", 6", 8" and 10" sizes.

PRECISION PORTABLE Saw Rigs. Three sizes for light, regular run or heavy work. Kost Kutter Sr. shown is modern, streamlined, sawdust proofed.

NEW CMC HOIST—huskily built, easier operated, single and double drum units from 5 to 40 horse power. Combine efficiency without extravagance in cost.

LABOR SAVING Bin Batcher saves time and man power in charging 10S or 14S Mixer. Portable—easily moved from job to job.

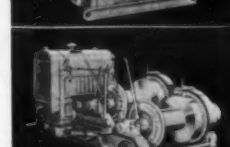
BUCKETS—HOPPERS—CHUTES—CMC offers all types of equipment for placing concrete more economically.

FAMOUS CMC Dump-over Pneumatic Tired Carts. Save on planking—speed up work—last longer. Also steel wheel carts.

BETTER BUILT Wheelbarrows—marked the first improvement in barrows in years. Rubber balloon tired wheel or steel wheels.

WRITE FOR LATEST CATALOG—JUST OUT!

CONSTRUCTION MACHINERY COMPANY
WATERLOO, IOWA



"IT DIGS AND FILLS
BETTER IN SHALE
AND ROCK THAN
ANY BUCKET
I HAVE EVER USED"



Now...
WELDED
Rolled Steel
Construction

Bulletins describing all types of Williams Buckets sent free on request

● This statement came from a crane operator who for 25 years has worked with all types of buckets. The bucket which won his praise is a 3/4 yard Multiple Rope Williams Bucket used by F. F. Mengel Company, Wisconsin Rapids.

The men at the controls know how Williams Buckets can help make time in digging and moving yardage. The men in the "front office" know how Williams Buckets stack up in long service and low maintenance cost.

They're "Built to Last, and Move
Dirt Fast"

THE WELLMAN ENGINEERING CO.
7012 Central Ave., Cleveland, Ohio

WILLIAMS
Buckets
built by WELLMAN



C. & E. M. Photo
A catch basin inlet safe for automobiles, and with good pavement rolling for drainage.

Repaving 3 Miles Of Mass. Highway

(Continued from page 17)

per cent American Powder Division dynamite and blasting caps.

Serving the public as well as servicing equipment throughout the construction of a highway project are two important functions. In order to prevent inconvenience to the traveling public and particularly local traffic, the contractor was required to keep the highway open at all times. This was done except for 2 days when all traffic was stopped over a short section and bus passengers were required to walk a short distance to connecting buses. Swansea is in the heart of the southern Massachusetts vacation area and the discomfort to traffic around the Fourth of July period would have been considerable. It is to the credit of the contractor that he kept the road open and clear for nearly 100 per cent of the time.

For serving the job two Ford service trucks and a pair of pickup Ford trucks were busy all the time.

The Base Course

The base course consisted of 4 inches of $2\frac{1}{2}$ to $1\frac{1}{2}$ -inch stone rolled and penetrated with $1\frac{1}{2}$ gallons per square yard of Socony asphalt in one application. The application of the asphalt was done by G. A. Winter, who used Etnyre distributors. The penetrated stone was filled with $\frac{3}{4}$ -inch stone and rolled and finally keyed with $\frac{1}{2}$ -inch pea stone. Two Buffalo-Springfield 14-ton rollers

were used for the rolling of the penetration course. Most of the large stone for this course was spread with a Burch spreader box but some portions were end-dumped and spread to final shape with a Caterpillar No. 10 diesel patrol grader.

The Surface Course

The binder course $1\frac{1}{4}$ -inch thick consisted of the modified Colprovia mix using stone passing a 1-inch square screen and 5 per cent retained on a $\frac{3}{4}$ -inch screen, and 4 to 6 per cent asphalt binder. The binder course and then the top course 1 inch thick were spread 12 feet wide with an Adnun Black Top Paver. The only exception to this was when an excess of binder was needed and then hand shoveling was resorted to and the Adnun kept at the $1\frac{1}{4}$ -inch spread. The surface as well as the base and binder courses were laid with a $3/16$ -inch per foot crown to the center of the roadway, with an exception at all super-elevated curves which were rolled flat and one section where the top of the crown was 15 feet from one side of the road and 18 feet from the other.

The binder and surface material were hauled 19 miles from the Gamino plant in Providence, R. I., in 6 and 8-ton loads. Behind the Adnun spreader there were three rakers and three shovel men and when working against the curb a hand tamper was added. The breakdown of the bituminous mix was made with an 8-ton Buffalo-Springfield tandem roller and on hot days this same weight was continued for the finish rolling. On other days the finish rolling was done by a 12-ton machine of the same type and make.

Curbing and Sidewalks

For most of the contract on both sides of the roadway, granite curbing was installed. There was 6,000 feet of sloping-edge granite curbing and the balance was the same 5-inch wide x 17-inch deep curbing laid upright.

Sidewalks 4 feet wide were provided on both sides of the roadway with a 3-foot loam area between the curb and the walk. The sidewalks had a base of 6 inches of gravel, then a $2\frac{1}{2}$ -inch penetration course topped with 1 inch of the modified Colprovia. The sidewalks were rolled with a 2-ton tandem roller.

Treatment of Old Bridges

Instead of widening the two old

bridges on the project the plans called for providing the modern instrument of a sidewalk by merely hanging the sidewalk on one side of the bridge outside the hand-rail and building up a new outer hand-rail. Both a 30 and 36-inch I-beam were used for this purpose.

Since the hurricane of September 21, 1938, all new construction provides more protection against unusually heavy tides and waves caused by high winds. On this project there was considerable riprap installed on the exposed sections of fills at the ends of the two bridges. Since fairly heavy stone was required this might have been a considerable item had it not been for the keen eye of the contractor who discovered a considerable amount of heavy granite from mills being dismantled in Fall River. This stone proved most acceptable for the riprap and saved a nice bit of change in haul.

Personnel

Work on this contract was started April 3, 1939, with a contract limit of

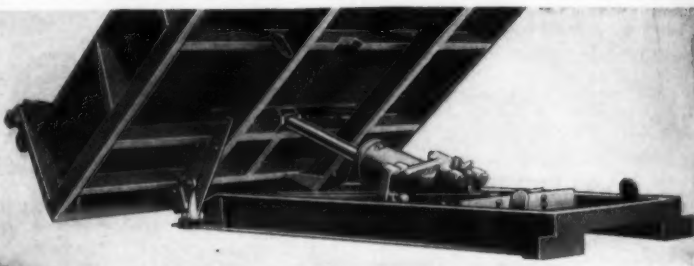
September 15, 1939, for completion. The work was in charge of J. F. Abbe-man as Superintendent for the M. A. Gamino Construction Co. of Providence, R. I. Michael Crowley was Resident Engineer for the Massachusetts Department of Public Works.

Reference Booklet on Concrete Paving Joints

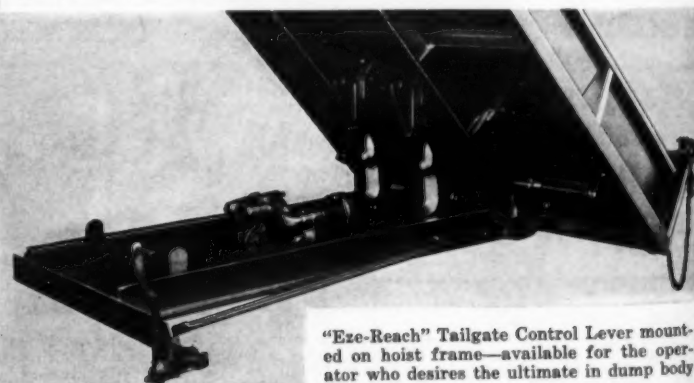
The essential requirements of concrete paving joints, with pertinent quotations from federal and state authorities and numerous illustrations of installations and comparative designs, are given in Booklet A-40, which has recently been issued by W. S. Godwin Co. Inc., Race & McComas Sts., Baltimore, Md.

State and county highway engineers and officials interested in solving the problem of controlling the free ends of concrete slabs will find this 22-page brochure of particular value. Copies of this booklet may be secured free on request by mentioning CONTRACTORS AND ENGINEERS MONTHLY.

To Lift With Ease Use **HERCULES** HYDRAULIC HOISTS and DUMP BODIES Built in Every Style and Capacity



Hercules Direct Lift Hydraulic Hoists are engineered to give efficient service to the most critical of users. Balanced Piston Valve operates easily and independently of oil pressures; an exclusive Hercules feature. Hoist will not cramp in any position. Recommended for $1\frac{1}{2}$ and 2-ton trucks, under any style contractors, garbage, or coal type body 7', $7\frac{1}{2}$ ', 8' long.



"Eze-Reach" Tailgate Control Lever mounted on hoist frame—available for the operator who desires the ultimate in dump body efficiency.

Model K. Hoist incorporates the famous Hercules "Center-Lift" principle. Balanced Piston Valve. No high pressure oil lines. Hoist mounted in heavy-gauge welded steel subframe. "Button-Ease" dash control for both Power Take-off and hoist available when specified.

DIRECT-LIFT HOISTS
CENTER-LIFT HOISTS
TWIN HOISTS
For Every Type of Service
With
CONTRACTORS' BODIES
GARBAGE BODIES
COAL AND COKE BODIES
ROCK BODIES
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Write for Literature

HERCULES STEEL PRODUCTS CO., GALION, OHIO

KEEP 'EM WORKING and Make More Money



Profits go up when you keep your tractors, trucks, rollers, graders, hoisting engines, etc., working.

Hypressure Jenny Steam cleaner, is one sure way to help keep your machinery and equipment on the job. It speeds repairs; saves 15 minutes out of each machine-repair hour (and also mechanics' time); and cleans so thoroughly that cracked or worn parts are discovered and fixed before they cause failure.

Hypressure Jenny is also a low-cost means for heating water, sand, and gravel for construction jobs during cold weather. Let us show you how much Hypressure Jenny can save YOU.

TEAR
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HOMESTEAD VALVE MFG. CO.
P. O. Box 30, Coraopolis, Pa.

Tell us how, and how much JENNY can save us.

We have _____ men employed on equipment maintenance.

We repair _____ pieces of equipment monthly.

We repair _____ trucks monthly.

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We want to clean _____

Name _____

Address _____



Winston & Griffith's sod-cutting machine.

Erosion Control Aided By Special Equipment

(Continued from page 23)

work as well as improving its quality.

The first of these machines, which on this project was used for loading the mulch sod, is a small elevating grader attachment developed by the contractor especially for this work. The carrier belt of this small machine is operated from the power take-off of a 30-hp crawler tractor and all lifts are hydraulically operated. Three claims covering the novel features of this machine have been granted by the U. S. Patent Office. The unit excavates the top soil to a depth of approximately 12 inches and dumps the material into trucks, which in turn take the material to the job. In addition, the contractor used this machine for minor grading in reshaping ditch sections. As the machine is small, it proved to be a safety asset on this project, which was carried on under traffic, as it could work in the ditches without disturbing the normal traffic flow.

The other machine, on which patents are also pending, is a sod-cutting machine which was used to prepare the block sod. This machine is mounted on two wheels, and is equipped at the front with a revolving wheel carrying six equally spaced transverse cutting blades. At the rear are two disks which cut the sod in parallel lines. The blades at the front make the end cuts of the blocks of sod and the rear disks the side cuts. The third dimension is given by means of a transverse horizontal blade in the rear that is adjustable for any desired thickness of blocks.

The Contractor

The firm of Winston & Griffith is comprised of W. O. Winston and J. C. Griffith. Mr. Winston has been in the contracting game since 1927 when, with the late Major C. R. Hopper, he formed the Hopper-Winston Construction Co. In 1929 Winston bought out Hopper. His association with J. C. Griffith began in 1931 when Griffith became Winston's foreman on jetting fills preparatory to paving. In May, 1935, Mr. Griffith bought a share in the business and since January, 1939, Winston & Griffith has been a 50-50 partnership, with Winston in charge of procurement of work and home office affairs, and Griffith in entire charge of construction, often directing simultaneously the activities of a dozen or more foremen on as many jobs.

To Mr. Griffith goes most of the credit for the invention and development of the two machines which have been used with such success on mulch sodding and roadway excavation in Texas and Mississippi, and which was judged a contribution to roadside development meriting the National as well as the Southern Section Award in the 1939 Roadside Development Awards sponsored by CONTRACTORS AND ENGINEERS MONTHLY.

Long Floating Bridge To Be Sodium-Lighted

The world's longest floating bridge, the 1½-mile pontoon span being constructed across Lake Washington near Seattle by the Washington Toll Bridge Authority and described on page 8 of the December 1939 issue of CONTRACTORS AND ENGINEERS MONTHLY, will be illuminated at night by sodium lights. The interior of a twin-bore tunnel, 1,487 feet long, at the western approach to the bridge will also be lighted by sodium lights, while mercury lights will illuminate the tunnel entrances.

The floating bridge and the tunnel, which are part of a 6.6-mile highway project designed to shorten the eastern approach to Seattle, will be opened to traffic in July, 1940. On this project, 131 General-Electric open-type sodium luminaires, with airplane-shaped reflectors and 10,000-lumen lamps, will be installed on ornamental metal poles spaced 175 feet apart along the 59-foot wide span. In the tunnel, 41 especially designed tunnel sodium luminaires will be used, mounted in the ceilings and spaced 80 feet apart.

Studies by lighting engineers show that tunnel lighting presents special problems not found in highway, street and bridge lighting. For example, as a driver enters a tunnel during the day, the light intensity drops from approximately 5,000 foot-candles daylight to less than 5 foot-candles. The eye can not rapidly adjust for this decrease in intensity, and the driver becomes temporarily blinded. Increased entrance lighting in the daytime assists the driver's eyes to become gradually accustomed to the change. For this reason, the Washington Department of Highways engineers will install 16 additional mercury luminaires with 16,000-lumen lamps just within the tunnel entrances.

L. V. Murrow, Chief Engineer of the Washington Toll Bridge Authority and Director of Highways for the State of Washington, was an early pioneer in the

use of sodium lighting to facilitate and protect traffic at night. He directed the first installation of these lights west of the Rockies with a system along 3 miles of the Pacific Highway in 1936.

Roadsides

Every engineer who "goes for" roadside stabilization by planting and other known expedients isn't advocating the culture of exotic flowers along our highways any more than the man who speaks from a soap box is advertising soap. Nor is the engineer who keeps the run-off of water and silt from roads under control, in order to protect adjoining land and streams, necessarily in favor of indiscriminate erosion control.

There has been too much wasteful spending of \$200 an acre on \$10-an-acre land while heavy road investments were in jeopardy. There has been some unwise city-park landscaping along country roads where native growth would better serve both appearance and protection.

The object of roadside treatment being to reduce future road maintenance, it is evident that effective measures that cost but a small per cent of the road cost per mile (say less than 4 per cent) will win out in the long run. In this category will come native seeding and mulching with local vegetation or litter. The results will be better roads and, incidentally, more attractive roadsides.

An editorial in *The Engineers' Bulletin* published by the Colorado Society of Engineers.

New Motor Grader Is All-Round Unit

The new low-cost motor grader recently announced by the Allis-Chalmers Mfg. Co., Tractor Division, Milwaukee, Wis., is designed to handle, at a minimum cost, all types of road-maintenance jobs, average construction work, and light ditching. The long 120-inch wheel-base, wide front axle, and the grader-type blade and drawbar enable this unit to build and clean ditches, making it a ditch-to-ditch maintenance machine, according to the manufacturer. In addition to roads and ditches, it can also be used to build and maintain terraces.

This new W-Speed Patrol is equipped with a 10-foot reversible moldboard. The lifting mechanism is easily operated by two large hand-wheels. With speeds up to 10 miles an hour, this one-man-operated unit can maintain 3 to 5 miles of road an hour. It is powered by a medium-speed 4-cylinder tractor

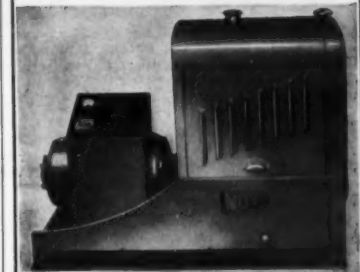


The new W-Speed Patrol.

engine developing 31 hp at 1,300 rpm, with a fuel consumption of one gallon an hour. Having a total weight of 5,960 pounds, this patrol can exert a blade pressure of 4,780 pounds. Electric starting and lights are standard equipment.

Further information on the W-Speed Patrol may be secured by interested contractors and state and county highway engineers direct from the manufacturer by mentioning this item.

LIGHT and POWER



When and where you want it... with...

NOVO GENERATING SETS

NOVO GENERATING SETS will give you a smooth flow of dependable power for economical lighting and operation of portable electric tools.

These sets are close-coupled, streamlined, light weight, and portable—ideally suited for construction jobs and oil field operations.

Built in 15 different sizes from 1 KW to 10 KW, DC and AC—powered with Novo heavy-duty gasoline engines or diesel power units.

Novo Generating Sets are the ideal source of electric current on jobs where portable electric tools have revolutionized methods of construction, making it possible to bring tools to the stock rather than moving the stock to stationary machinery.

Send the coupon right now!

NOVO ENGINE COMPANY
LANSING, MICHIGAN

NOVO ENGINE COMPANY
216 Porter St. Lansing Michigan
Send descriptive bulletin and prices on Novo Generating Sets.

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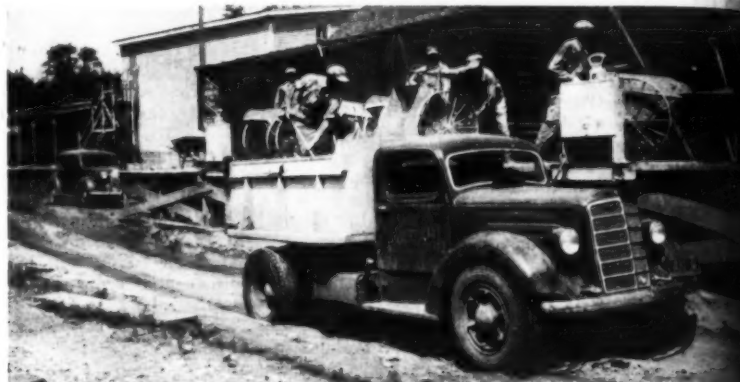
Contractors and Engineers Monthly



The battle with snow goes on and, even in rural districts, the public demand for snow-free roads is heeded. Above is a Caterpillar diesel Auto Patrol and V-plow, owned by the Cottonwood, Idaho, Highway District, clearing the highway in that section.



The general headquarters of the Ottawa County Road Commission in Grand Haven, Michigan. Attached to the office building, on the right, is the central garage. See page 18.



C. & E. M. Photo

Fast work at the bulk cement dock of Joseph D. Bonness for his 12.86-mile paving contract between Spring Green and Gotham, Wis., last summer. See page 18.

Below, the big fill to the west of Clear Ridge cut. Inset, J. I. Kepner, Resident Engineer for the Pennsylvania Turnpike Commission on this section. See page 2.

C. & E. M. Photos



Below, the east end of the twin skew arch bridge over Clear Creek. Inset, M. R. Corbisello, contractor for Contract 27, Section 13-E, on the Turnpike. See page 2.

C. & E. M. Photos



C. & E. M. Photo

Conerating plant for the sewage treatment plant at Meriden, Conn. See page 2.



Scenes of activity at Pacheco Pass in California, the contract for the improvement of which was awarded to Granfield, Farrar & Carlin of San Francisco. Left, bulldozers and rooters were used to trim slopes, keep the cuts clean, and rustle around large boulders while, at the right, the contractor's work downhill in one of the cuts on the job. See page 1.

